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BEFORE THE WIND

A Study of the Response to Hurricane Carla

by
HARRY ESTILL MOORE
FREDERICK L. BATES
MARVIN V. LAYMAN
VERNON J. PARENTON

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Disaster Research Group
Disaster Study Number 19

National Academy of Sciences
National Research Council

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DISASTER RESEARCH GROUP

The Disaster Research Group is an activity of the Division of Anthropology and Psychology, National Academy of Sciences — National Research Council. It succeeds and carries on many of the functions of the Committee on Disaster Studies, which met under the auspices of the Division of Anthropology and Psychology from 1952 to 1957.

The Group conducts research, sponsors conferences and publications, and generally provides advice on problems of human behavior in disaster and civil defense. To assist the new Office of Emergency Planning it has created the NAS - NRC Committee on Behavioral Research (Advisory to OEP). The Group continues publication of the Disaster Study Series initiated by the Committee on Disaster Studies.

The Group's activities have been supported by the Surgeons General of the Armed Forces, the National Institute of Mental Health, the Ford Foundation, the Office of Civil and Defense Mobilization, and the Office of Emergency Planning.

BEFORE THE WIND

A Study of the Response to Hurricane Carla

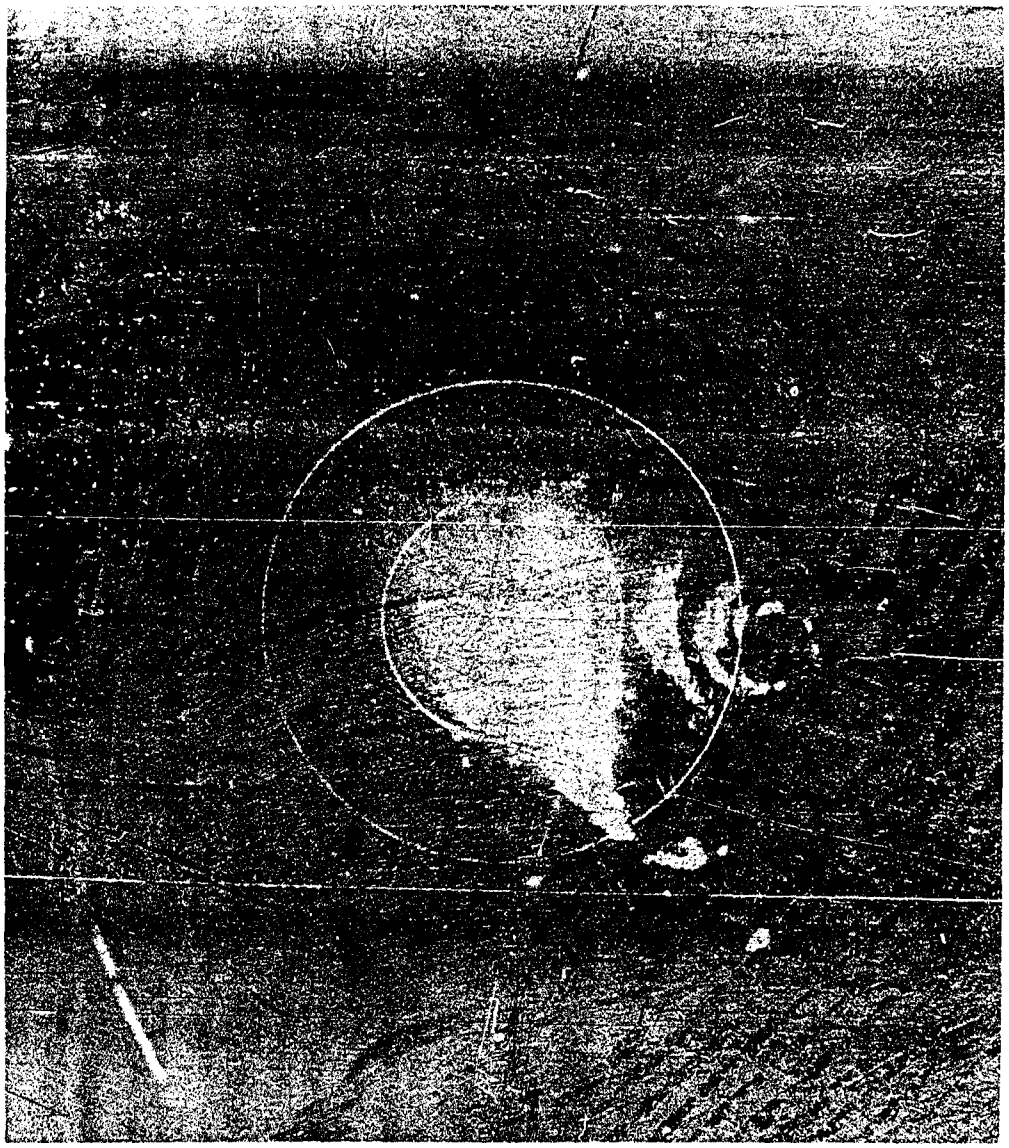

Photo of Radar Scope, showing Hurricane Carla Naval Air Station, Corpus Christi.

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Foreword by
ROBERT F. SHEA

Publication 1095
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Washington, D. C.
1963

This is a report of research done under contracts OEP-SR-62-23 and OEP-SR-62-25 with the Office of Emergency Planning, Executive Office of the President, and with a grant from the Hogg Foundation for Mental Health, University of Texas.

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FOREWORD

BEFORE THE WIND represents the first major study of a large-scale pre-disaster evacuation and will be of interest to all organizations, public and voluntary, which share some of the responsibility for the safe and efficient evacuation of a disaster-threatened locality.

This study of the Hurricane Carla exodus is of particular significance because this hegira involved the voluntary movement of hundreds of thousands of people in the face of a major threat to their safety and well-being. As a thoughtful, well-done study, this represents an additional contribution to the growing body of research contributed by our social scientists in the field of disaster.

The American Red Cross believes it important to work with our research scientists and institutions, and has continuing interest in the contribution that they are making to the improvement of service to people under emergency conditions.

Robert F. Shea
Vice President
American National Red Cross

PREFACE

Current understanding of some non-precipitate disaster agents, e.g., hurricanes, floods, plus the availability of rapid communication services, often permit the residents of an area to be warned before a disaster strikes. However, individual, family, and community protective resources are not always strong enough to resist the tremendous forces exerted by wind and water. Under such circumstances, when the available protection is known to be inadequate, the most rational course of action is prompt withdrawal or evacuation from the threatened area. Historical records of disaster casualties often document the fact that behavior at the individual and community levels is not always rational. Hurricane Audrey's impact on southwestern Louisiana in 1957 offers strong evidence on this point. Four years later the evacuation record for the communities threatened by Hurricane Carla was significantly different. These differences suggest crucial basic questions for both research and operational personnel.

Some measure of the importance of evacuation is suggested by Richard Titmuss's 1950 treatment of this subject in his Problems of Social Policy. Of the twenty or more major problems experienced by the United Kingdom during World War II, evacuation is among the three that were finally selected by Titmuss. When the first evacuation planning document was produced in England, 1931, its authors could draw on only a very limited body of empirical data. Almost no large-scale population movements of this nature had been systematically studied by behavioral scientists. While Titmuss's 1950 work has become a landmark, it tells us very little directly about the attitudes and actions of evacuees as members of various family, occupational, and other social units. It does document dramatically the unanticipated importance of such reference groups in voluntary evacuation decisions. British planners were somewhat surprised to learn that parents did not want to be separated from their children even during periods of heavy bomb damages. And Titmuss also records that the large-scale panic behavior which was anticipated in the 1930's did not in fact occur in spite of severe and prolonged bombardment of London and other large urban centers.

Titmuss's book was published at a time when a few people in the United States Department of Defense recognized the need to support research which would produce reliable information on how people behave and how their behavior is perceived under disastrous or stressful

circumstances, including evacuation. The Department's active interest ultimately resulted in the creation within the National Academy of Sciences—National Research Council of the Committee on Disaster Studies. The Committee staff soon had an opportunity to initiate field research which would yield new knowledge. The four-volume work, Studies in the Holland Flood Disaster, 1953, added substantially to our understanding of a wide range of disaster behavior, including the evacuation phase of the flood experience. Soon after the appearance of this publication the Disaster Study Series was initiated.

While many other disastrous events have since been studied, the published empirical literature does not add greatly to the earlier analyses of large-scale population movements. The chief means employed for creating new civil defense evacuation planning data was the operational exercise, e.g., Operation Walkout in Spokane, Washington, and Operation Scat in Mobile, Alabama, both in 1954. Clearly these simulated activities have limited value. Harold Guetzkow's recent chapter on "Joining Field and Laboratory Work in Disaster Research" in Man and Society in Disaster reviews several limitations which affect such exercises.

The occurrence of Hurricane Carla in September, 1961, provided a most significant research and planning opportunity. Over half a million residents of coastal Louisiana and Texas were evacuated from their homes. Since this event happened after nearly ten years of active disaster research, a body of literature for the guidance of the project was available. An organizational mechanism, the Disaster Research Group of the National Academy of Sciences—National Research Council and its Committee on Behavioral Research (advisory to the Office of Emergency Planning), was at hand for the promotion and coordination of the project. Financial support was obtained from the Office of Emergency Planning.

The selection of the two principal investigators was both fortunate and deliberate. Both Harry Moore and Fred Bates had already achieved experience and recognition for their published work on disastrous events in Texas and Louisiana. The fact that Hurricane Carla struck a section of Louisiana that was already under study by Bates brought an additional element of strength to this study.

The cooperation of Ralph Spear and Joseph Coker (both on the staff of the Office of Emergency Planning) in implementing the project is gratefully acknowledged. It is also a pleasure for us to note the active interest of the staff of the National Headquarters of the American Red Cross. This agency's interest in utilizing research findings is reflected in Robert Shea's Foreword.

The present work is the nineteenth and last in the Disaster Study Series. The program of the Disaster Research Group was terminated when administrative changes in the Federal government made its continuation in the Office of Emergency Planning inappropriate. However, we hope that the work done under this program will be found sufficiently valuable and suggestive that other agencies, public or private, will be stimulated to resume systematic research on behavior in disasters and other related stressful situations without delay. At this date the claim that such work is basic to the development of useful generalizations on individual and group behavior need not be defended. Similarly it is no longer necessary to document the desirability of ensuring that a balanced research effort be maintained for the continuing development and review of Federal, state, and local plans for the prevention and control of both natural and man-made disasters. The findings from this study of the Hurricane Carla evacuation should contribute to both of these general objectives.

Leonard S. Cottrell, Jr.
Secretary
Russell Sage Foundation

George W. Baker
Program Director for
Behavioral Sciences Facilities
Office of Institutional Programs
National Science Foundation

3 September 1963

ACKNOWLEDGMENTS

Monday, September 11, 1961, was a black day for the Gulf Coast from Grand Isle to Corpus Christi. Hurricane Carla slammed into the small town of Port O'Connor and moved onward across the state, across the nation, into and across Canada, killing nearly half a hundred persons and doing nearly half a billion dollars in damage to property.

Thursday, September 14, was the day on which the research here reported was begun. George W. Baker, Fred Bates, and Harry Moore flew over the devastated coast from Galveston to Corpus Christi and back to Houston that afternoon. That night they planned how best to study the social aspects of the catastrophe. Preliminary decisions were made and the three men separated to return to their jobs; Baker to the National Academy of Sciences—National Research Council Disaster Research Group, Bates and Moore to their teaching and research duties at Louisiana State University and the University of Texas.

Negotiations for a contract to provide funds for the research were begun with the Office of Emergency Planning, with George Baker acting as intermediary. A satisfactory understanding for the research was subsequently reached and a formal contract was signed. Meanwhile, research associates at both universities had been enlisted and the task of developing detailed plans for the research had proceeded. A grand strategy of focusing on the social-psychological aspects of the disaster was adopted. Schedules for interviewing were developed, revised, submitted to the Bureau of the Budget for approval, revised again and finally frozen in a form agreed upon by all those concerned.

Once the details of the contract and of interview schedules were settled, the interviewing of 1,500 informants in five sites was begun. As the schedules began to be returned by the field workers, the unrewarding grind of coding, punching, running, and calculating began and took all the time that could be spared, or bought, through the summer months and into the fall. Other conferences were held, a verbal report was given to the sponsoring agencies in Washington, and the general outlines of the final report emerged.

It should be emphasized that this is a report of work done cooperatively, but with a minimum of day-by-day collaboration between the researchers at the two universities. A division of labor was agreed upon early in the planning, and data of pertinence were divided between the two staffs, regardless of who had originated it. For example, an early study of evacuation was done at the University of Texas, using a questionnaire administered through the schools. Later a member of the Texas staff, David L. Treybig did a study of shelters and their operation in Austin, which was turned over to the staff at Louisiana State. Approximately 1, 300 of the 1, 500 interviews were done by the Texas staff. But analysis of data, by and large, was left to the responsible staff members at the two schools. All statistical data were interchanged.

Acknowledgement of indebtedness to those who helped secure and interpret data is one of the most pleasant experiences of the project. At the institutional level the Texas Department of Public Safety and the American Red Cross must be placed at the top. Not only did both give us free access to their data, but both went further and dug out any other information they had which we thought might be of value to us. The Department of Public Safety and Texas State Division of Defense and Disaster Relief allowed members of the Texas staff to sit with them in their control center in Austin and later gave us access to message files so that we might see the shape and order of data as it came to them during the days of the emergency. Other state departments gave us everything for which we asked and that they had. The Texas Department of Public Welfare and the Adjutant General's Office were particularly helpful. Newspapers and broadcast stations supplied us with photographs and other invaluable materials.

Persons who should be named are all of those who helped in the offices at the two schools and in the field work. To name them all would be burdensome to the reader. But personal mention, and accolade, must go to John M. Ellis and Terry McLeod for their assistance in recruiting and supervising interviewing staffs in Baytown and Galveston, and to S. Thomas Friedman for his work in conducting the school evacuation survey and for organizing the field work in Calhoun County. Meda M. White, on an NIMH fellowship worked tirelessly developing materials on the impact of Carla and deserves special credit. Marie M. Fuller and Donald L. Mischer did the study of newspaper coverage of the hurricane. Charles and Drollene Title did yeoman work in the Austin Office, as did Mary Ellen Gross, as research assistants. Manford Barber did much of the newspaper clipping and

thereby fed their data to Mrs. Fuller and Mr. Mischer. A succession of secretaries, Eleanor Boyd, Linda Henslee, May Beth Propsma, Joy Rogers, Nancy P. Troike, and Ida Fisher, put up with the whims of the director of the project and his associates and managed to get their jobs done in addition. The last named devoted nights and weekends to the project when that became necessary.

Jon Alston, holder of a Hogg Foundation scholarship, worked tirelessly with Marvin Layman at the IBM machines and in constructing tables and testing significance of differences. He also did a comparative study of the impact of the hurricane on Cameron Parish and Chambers County which is planned for publication elsewhere.

Charles W. Fogleman and Robert H. Pittman of McNeese State College in Lake Charles supervised the Louisiana portion of the field work for this project and conducted interviews with local leaders to secure valuable qualitative data. Their intimate knowledge of Cameron Parish and of its disaster history was of invaluable assistance in making this research realistic.

A. L. Bacon and C. H. Bonnette supervised data processing in Louisiana and aided in the construction of tables and the testing of hypotheses.

Walfrid J. Jokinen and George S. Tracy gave valuable advice at all stages in the research process but particularly in the writing of the first draft report. Audrey F. Borenstein deserves all our thanks for her efforts in editing the final manuscript and making consistent the styles of the several writers.

Charles P. Loomis of Michigan State University, Daniel O. Price of the University of North Carolina, Roy I. Popkin and Frank C. Nalle, both of American National Red Cross, George E. Baker of National Academy of Sciences—National Research Council, Joseph D. Coker of the Office of Emergency Planning read and criticized a preliminary draft of the reports in a conference called for that purpose. Other criticisms of the early draft were made by the Weather Bureau, Civil Defense—state, regional and national offices—the Texas Department of Public Safety, the Texas Adjutant General's office and the Texas State Department of Health. Fred R. Crawford and James O. Smith of the latter agency were collaborators on an important phase of the research.

All of the criticisms made were carefully considered and many changes made to incorporate the suggestions into the final writing. For these we are deeply grateful. However, final judgment of accuracy of facts and their interpretation was retained by the authors; and errors that remain in spite of the best efforts of our critics must be charged to us.

Interviews obtained from the persons most immediately involved in the emergency constitute the primary source of the data presented in this report. Other materials from mass communication sources and interviews with persons not so intimately concerned have been made the basis for a companion report, And The Winds Blew, being published by the Hogg Foundation for Mental Health. The two reports are designed to complement each other and, together, to give a deeper understanding to the catastrophe and reaction to it than can be obtained from either alone.

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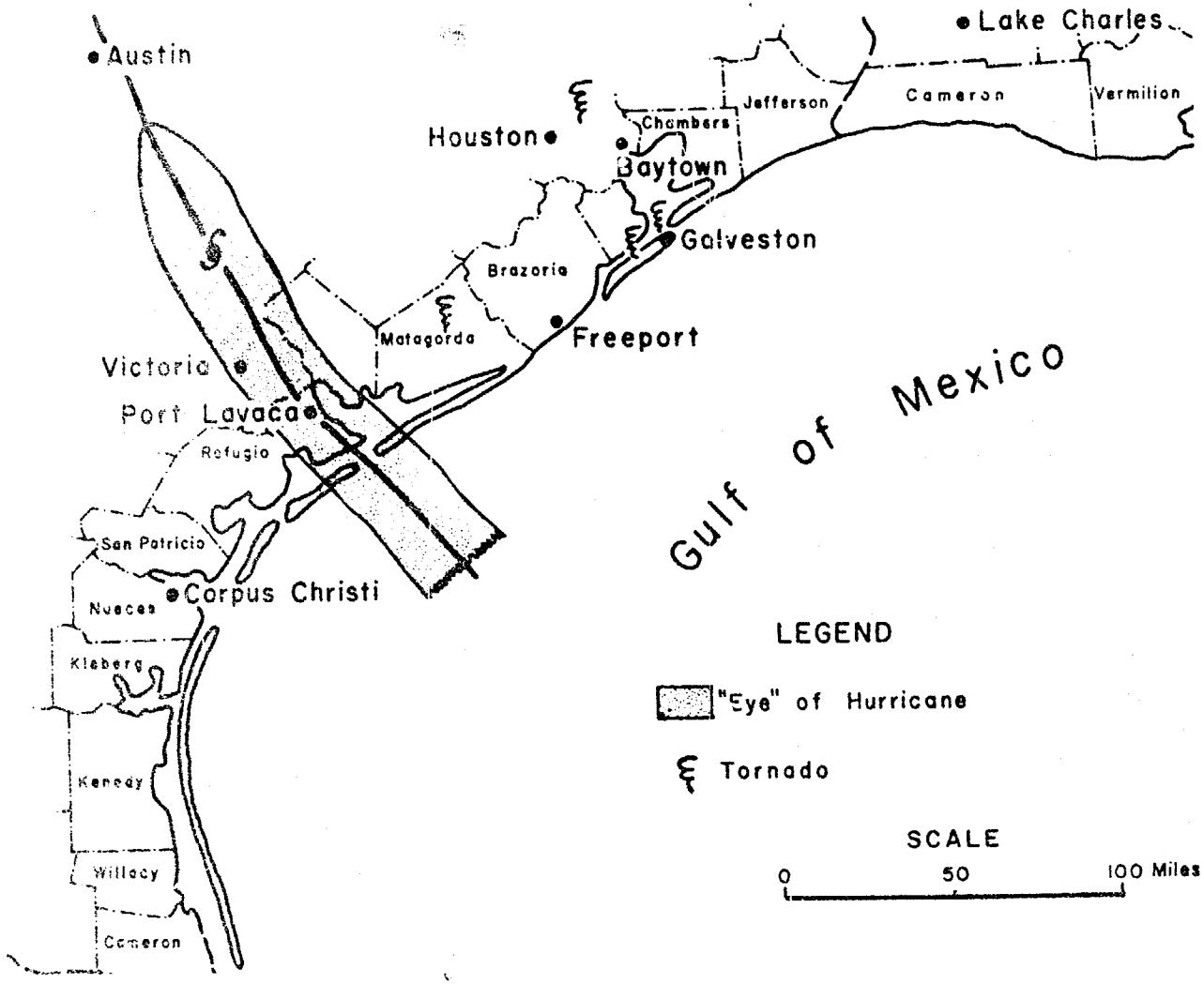
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Corpus Christi
Nueces
Kleberg
Kenedy
Willacy
Cameron
Gulf of Mexico
LEGEND
"Eye" of Hurricane
Tornado
SCALE
0
50
100 Miles

CHAPTER I

THE PROBLEM

Introduction

Hurricane Carla appeared as a showery area associated with a "tropical depression," in the southwestern portion of the Caribbean Sea on Monday, September 4, 1961. The next day, the U. S. Weather Bureau affixed the label "tropical storm" to the hurricane, and advised that appropriate precautions be taken by shipping in that area. By the time the storm had passed through the Yucatan Channel into the Gulf of Mexico, winds of gale force revolved around a center and covered an area some 400 miles in diameter. Wind velocity increased to 125 miles per hour near the storm center, and tides began to run higher than normal along the eastern beaches of the Gulf.

Residents of the low-lying areas just back of the coastal ridges, remembering the hurricane lore that is a part of their cultural heritage, began to make preparations for visits to friends and relatives who lived further inland and on higher ground.

By Friday the Weather Bureau labeled Carla "Large and dangerous," and extended its formal hurricane watch southwestward to the Mexican border. Saturday night was estimated as the period in which the storm would move across the coast. Then a meteorological miracle happened. A large and strong high pressure area of cold Canadian air moved into position to block the usual eastward swing that tropical storms normally make soon after they enter the Gulf. Thus, the storm continued northwestward. Since predictions of the area of impact had been predicated on the usual shift in direction, these had to be revised—forecast period by forecast period—always westward; from the rich "Mouth of the Mississippi" area on Friday, to the industrial complex of the Sabine Basin on Saturday morning, to the chemical plants along the Texas coast as far south as Corpus Christi by Monday. On Sunday and early Monday, the storm hovered some 200 miles off shore, moving as slowly as five miles per hour, shifting direction so as to threaten, alternately, Corpus Christi and Galveston. Finally, on Monday afternoon, September 11, the blow fell across the Air Force installation on Matagorda Island, the towns of Port O'Connor and Port Lavaca. As it did, winds

mounted to an estimated 175 miles per hour (measuring instruments were blown away, so no exact measurement was made), the barometer dropped to a low of 27.62, and the tides in the bay near Port Lavaca were 22 feet above normal.

Torrential rains, tornadoes, and winds of gale force accompanied the storm across Texas, Oklahoma, Kansas, Illinois, and Michigan, on across Canada and into the Arctic wastelands, leaving death and flood damage in those states in addition to the heavy toll exacted in Texas and adjoining Louisiana. Altogether, an estimated 45 deaths, and property damage well in excess of $400,000,000, were attributed to this hurricane. The death toll, high as it was, ran well below the number predicted. This was largely due to the extended warning period, and to the detailed organization of evacuation plans which had been undertaken shortly after Hurricane Audrey had devastated Cameron Parish, Louisiana, five years earlier.

An estimate of the total number of persons evacuated because of the storm was derived in the following manner. The percentage evacuation in each of the communities studied was determined. An over-all percentage of evacuation in the sites studied was then calculated by giving weights proportional to the total population (1960 census figures) of the counties in which the sites were located. In the case of Harris County, only Baytown and other towns directly on Galveston Bay were included in the calculation. This gave us an average evacuation of 61.9 per cent of the total population for these areas. When applied to the total population of the coastal counties, plus the portion of Harris County on Galveston Bay, this gives an estimated total evacuation of 529,949. Certainly this figure is no better than a gross estimate; but is probably nearer the true figure than any other estimate made.

Estimates are that approximately 200,000 refugees spent at least a part of their time away from home at one or more of 650 shelters where some 20,000 persons sought to aid them. But the activity quickly shifted from the shelters to the roadblocks that prevented the evacuees form returning to their home sites, and to the temporary quarters many of them occupied for a period of time. Red Cross and other social agencies did what was possible to aid these displaced persons to plan for resumption of their pre-disaster lives. Local committees and contractors were enlisted to assure the greatest possible compliance with personal and local norms.

Civil and military authorities undertook the tasks of clearing debris and restoring public facilities. In this they were aided by an allocation of $8 million by the Federal Government acting through

Public Law 875, plus a large but undetermined amount added by local political units. Some large corporations made direct contributions to Red Cross and at least one company paid its taxes several months in advance in order to alleviate the financial strain imposed by the hurricane. Heavy equipment privately owned was made available for reconstruction purposes, sometimes at an agreed price, often as a gesture of good will.

Expenditures of the huge amounts for rehabilitation by Red Cross and governmental units and from the savings of families gave to the devastated area a spurious air of high prosperity which did much to lessen the suffering of the business community and provided work for many whose regular employment had been interrupted. This is one of the anomalies of major disasters; if enough property is destroyed, the necessary reconstruction causes the indices of economic well-being to indicate a healthy condition. In this connection, it is pertinent to note that while the Red Cross spent approximately $1,650,000 on relief and rehabilitation, Texans contributed more that $1,100,000 to this institution.

A more detailed account of the impact of the hurricane and of the rehabilitation program following appears in the companion report, And the Winds Blew.

Important as Hurricane Carla was as a natural disaster, it may have had even more significance as a subject for research into the possibilities of mitigating the effects of dire calamities on human life and social organization. The occurrence of this hurricane posed questions of vital importance to those charged with planning the defense of the nation: What can be learned from a study of Hurricane Carla that may be applicable to other catastrophes, natural or man-made? More specifically, what can be learned from a study of the largest evacuation recorded in American history?

Because of its potential importance as a protective measure in natural or man-made disasters, mass evacuation merits intense study. At present, our fund of systematic information on evacuation as an adaptive process is limited. Such knowledge as is now available stems from two sources. First, a number of studies were made of evacuation behavior during and after World War II (Iklé, 1958; Janis, 1951). These studies deal with the reactions of civilian populations to bombing, both nuclear and conventional. Second, studies of natural disasters have usually included a section on evacuation. These studies have, more often than not, focused on other consequences of impact, and have dealt with evacuation as a minor issue. In addition, most studies of natural disaster have dealt with rather small populations.

The studies of wartime bombing furnish valuable insights and useful hypotheses concerning mass evacuation in foreign countries. As yet, however, American populations have not been studied under similar situations. It would, therefore, be particularly valuable to civil defense planning if data on mass evacuation in an American population were available. Such information should also prove to be of great value to other disaster-oriented organizations, such as the Red Cross, state police, and state highway and welfare departments.

There are a number of interesting and important questions that need to be answered concerning evacuation behavior. For example, there is the question of why, when faced with the same threat and apparently subjected to the same warning, some people choose to evacuate while others do not. Has the type of warning anything to do with this? Do people perceive the same warning differently? Are there certain kinds of people who are more prone to evacuate than others? What are the decision processes involved in evacuation?

Another important issue involves the actual evacuation itself. In response to a threat such as a hurricane, how far are people apt to go when they evacuate? What kind of shelter are they most likely to seek? What problems develop for them while they are away from home?

Still other interesting problems involve disaster relief agencies. How do such agencies cope with evacuation? What coordination difficulties develop for them? How do they react to such difficulties?

It was with such questions as these in mind that this study of Hurricane Carla was undertaken.

The Research Opportunity

Hurricane Carla, offered a unique opportunity for studying mass evacuation. Carla was of such magnitude and behaved in such a fashion as to create acute danger of impending disaster over an area extending from Grand Isle, Louisiana, to Corpus Christi, Texas. Within this area were a number of large cities, as well as extremely isolated rural communities. Over one million people lived in the costal counties directly threatened by Carla. Another million lived in immediately adjacent areas which, in the event of a severe emergency, would be included in the probable impact zone. In response to the threat of Carla, a mass evacuation took place along the Texas and Louisiana coast on a scale unprecedented in American experience.

This report presents the results of a study of that mass evacuation and the events preceding and following it. This study of the reactions to Hurricane Carla, on the part of persons, institutions, and communities in the threatened area, naturally falls into two parts. These are (1) the threat posed by the approaching storm as perceived by the persons concerned, and (2) the actions taken by these persons on the basis of their perceptions. The second portion clearly is an outgrowth of the first, and cannot be understood—though it might be recorded—without a prior understanding of the threat as it was perceived.

Perception of the danger posed by Carla was derived from fragmentary information, not always complete and seldom presented systematically, available from whatever sources could be tapped. No matter how confused such information was the actions of evacuees and non-evacuees become explicable only against this background.

This information is to be presented in abbreviated form in a separate report. It consists primarily of excerpts from teletyped news reports from two radio stations, the message files of the Division of Civil Defense and Disaster Relief of the Office of the Governor, the Department of Public Safety (State Police) and the Adjutant General of the State of Texas. Reports of their activities were loaned by the American Red Cross, the State Department of Health, the State Department of Public Welfare, and the Medical Branch of the University of Texas (Galveston). These were helpful in providing data which filled some of the blank spots in the mosaic which was being developed. On the basis of such qualitative and quantitative material a separate and more detailed narrative report, "And the Wind Blew," has been prepared.

Perusal of this report should serve to place the reader of the present monograph in the position of an actor in the disaster situation. Thus he will be given a perspective with which to view the actions taken in a spirit of empathy. For reasons of space and economy in addition to differences in areas of interests, the two reports are published under separate sponsorship and in separate volumes.

Objectives

The devastation wrought by Hurricane Carla provides the necessary background for this study of a limited number of more mundane concerns. The following areas were selected for their pertinence to disaster and defense planning, and for their interest to social science:

1. To determine how the warning system operated prior to Hurricane Carla, and to ascertain its effectiveness under the diverse conditions prevailing in the various sectors of the threatened area.

2. To determine how evacuation was accomplished in the various sectors of the threatened area, and to study the decision-making process related to:

(a) personal and family decisions to evacuate voluntarily, and
(b) official decisions to order or advise evacuation.

3. To determine how public shelters were established and operated, and how persons and families were allocated to:

(a) public shelters,
(b) private homes, and
(c) commercial hotels and motels

4. To determine how the various disaster-oriented agencies, including civil defense, the Red Cross, state and local police, and the armed forces functioned during the warning, threat, impact and immediate post-impact periods, and to identify patterns of cooperation and conflict that developed within and between such agencies.

5. To compare the effectiveness of agencies that had had recent previous experience with Hurricane Audrey with that of agencies with relatively limited or no experience of this nature.

6. To determine what problems existed for agencies in the task of returning evacuees to the evacuated area.

7. To compare voluntary with ordered or involuntary evacuation.

8. To evaluate the results of this research in terms of possible application to thermonuclear disasters and to planning for future natural disasters.

To accomplish these objectives, a joint research was undertaken by sociologists from the University of Texas and Louisiana State University. Guidance for the research was supplied by the Disaster Research Group of the National Academy of Sciences, and funds for supporting it by the Office of Emergency Planning and the Hogg Foundation for Mental Health. Following is a brief description of the research design. A more detailed description of the methodology for this study is presented in an Appendix.

Research Design

Since eight Louisiana parishes and 15 Texas counties felt the force of the hurricane to some extent, a careful sampling plan was necessary. Populations of these units ranged from 7,000 to as high as 245,000, and from all rural to 96 per cent urban. One of the major metropolitan centers of the nation—Houston—was included, as well as a number of summer resort towns, fishing villages, stretches of ranch land, and several highly developed industrial communities, most notably Baytown and Freeport.

Several considerations figured prominently in working out a sampling plan for this project. First, it was desired that both rural and urban areas be studied since it seemed likely that the evacuation behavior in cities would differ from that in farming areas. Second, since it was hoped that something could be learned about why some people evacuate and others do not, it was decided that both areas of high and low evacuation should be studied. Third, because Cameron Parish, Louisiana, was already under study when Hurricane Carla struck, and because it represented an area with recent disaster experience, it seemed desirable to include it in this study. In order to obtain a maximum amount of information from knowledge of Cameron Parish, it was decided to seek a matching sample area in Texas. Finally, in order to test the effects of the degree of threat on evacuation behavior, it was decided to select areas with varying degrees of impact from Hurricane Carla.

Five sample areas were finally selected on the basis of these criteria. These areas are delineated in Table 1.1 along with the number of interviews conducted in each area.

Table 1.1. Sampling Areas Selected

Area	Households in Area	No. of Households Interviewed	Per Cent Interviewed
Calhoun County, Tex.	4,189	200	4.77
Cameron Parish, La.	1,863	208	11.16
Chambers County, Tex.	3,009	221	7.34
Baytown, Tex.	8,684	504	5.80
Galveston, Tex.	21,736	401	1.89
Totals	39,481	1,534	3.89

A detailed analysis of this sample is offered in the appendix; however, it is useful to summarize briefly the characteristics of the sample areas, and the procedures used for drawing the sample.

Calhoun County, Texas, was selected as an area of maximum impact and with a high evacuation rate. It was over this county that the eye of the storm passed as it plunged inland. Preliminary surveys indicated a high rate of evacuation. In fact, it approached 85 per cent. The county also had the advantage of containing both isolated, rural population and urbanized population in Port Lavaca.

Cameron Parish, Louisiana, was selected because it had already been studied in connection with Hurricane Audrey, and because it was the only sizable area in Louisiana where evacuation took place. Early reports indicated that the evacuation proceeded according to a carefully conceived civil defense plan, and that evacuation was virtually total. Cameron Parish is entirely rural. The parish seat of Cameron is an unincorporated village of approximately 1, 200 inhabitants.

Chambers County, Texas, was chosen for its comparability to Cameron Parish. It, too, is entirely rural. The economic characteristics of the two areas are also very similar, in that both are dependent upon cattle, rice, fishing, and petroleum, as well as the tourist trade. Evacuation in Chambers County, from early reports, appeared to have been medium-high.

Baytown and Galveston were selected as the urban areas to be contrasted to the above-mentioned rural areas. They were also selected as representative of high and low evacuation sites. Baytown, which is an industrial city of approximately 30, 000, is one of the oldest petroleum-processing centers on the Gulf Coast. It adjoins Houston and is a considerable distance from the Gulf proper. Evacuation there appeared to have been light—in the 30-40 per cent range.

Galveston was selected as a city with relatively high threat characteristics and a relatively high evacuation rate, in addition to its interesting past experience with disasters. Early reports indicated that an evacuation of 60-70 per cent had taken place in this area.

In each of these sample areas a systematic sampling procedure, which is described in detail in the appendix, was used. In every case, it consisted of selecting households according to a predetermined set of instructions. In each household an adult household member—usually husband or wife—was interviewed. A series of structured interview guides, so designed that different schedules were specified on the basis of whether the family evacuated or remained at home, was

employed. In the schedules, the same questions were asked both evacuees and non-evacuees about the warning experience and about their personal background characteristics.

The schedules were designed to meet the objectives stated earlier in this chapter, and were structured to make it possible to test a series of hypotheses which were formulated in advance. These hypotheses are listed below:

Hypotheses Related to the Warning Problem

1. The source of warning information is associated with the decision to evacuate. Warnings given by local authorities are more effective in stimulating evacuation than those emanating from (a) the Weather Bureau, (b) the Red Cross, (c) radio-television weather and news reporters.

(a) Local elected officials are reluctant to associate themselves with an order to evacuate, or even with specific advice to evacuate. As a consequence, responsibility is shifted to non-elected officials. Where there was a definite local plan for issuing warnings and evacuation advice or orders, and where this plan was executed, evacuation was more orderly and complete.

(b) The knowledge or belief that some areas have been ordered to evacuate while others have only been advised to evacuate will weaken the advice as an effective means of accomplishing evacuation. This is due to the fact that the situation in the area where only advice to leave was given will be adjudged less dangerous.

(c) Warnings accompanied by information concerning the location of shelters are more effective than those not accompanied by such information.

Hypotheses Associated with Decision-Making

2. Evacuation decisions are arrived at by families or other primary groups. Families will move as units and remain together, even at the cost of overriding dissenting opinions. Groups of families will form spontaneously in public shelters and remain intact, even though this means declining the offered comforts of private homes.

(a) Since arguments for and against evacuation are most clearly developed in geographic areas where opinion on the matter is most evenly divided, the decision-making process can be studied most profitably in such areas. (A device for locating such communities was developed and used.)

(b) Role conflict tends to abate after the decision to evacuate has been made and acted upon, but will begin to increase with plans for returning to the danger area. That is, during the early period of evacuation, the refugee tends to discard other roles, and become for the time being a refugee only.

(c) Role conflict is intense for such persons as physicians, governmental officials, and welfare workers, who are forced to weigh their own safety against the functions of their occupations. These persons will be found to be active in seeking support from their peers for their ultimate decisions.

(d) Warnings and other relevant information from known and trusted persons in informal relationships will be accepted and acted upon more readily than information from formal sources via the mass media. Those who evacuated will have discussed the danger with others more than did non-evacuees.

(e) A "snow-ball" effect will result from increased discussion and the visual awareness of friends, relatives, and neighbors evacuating, and comprise a strong inducement toward conformity. This will result in ecological patterns, roughly corresponding to "natural areas," with significantly differing percentages of evacuation. These differences will obtain even though the populations of these areas were subjected to the same formal warnings and to the same danger from the storm.

(f) Sex, age, and socio-economic status are factors involved in the decision to evacuate; females will be more ready to evacuate than males; families with small children will be more ready to evacuate than childless families; older people will be less prone to evacuate than younger people; upper and middle socio-economic groups will be more prone to evacuate than the lower groups.

(g) The distance travelled in evacuation will be associated with (1) socio-economic status, and (2) stage in the family life cycle.

Hypothesis Associated with the Shelter Problem

3. The choice of shelter area will be strongly influenced by sociological patterns in the evacuated community. People from the same neighborhood or community will tend to select the same shelter or shelter area.

(a) The type of shelter used will depend upon (1) accessibility of friends or relatives in a shelter area, (2) socio-economic status, (3) neighborhood or community factors.

(b) People will tend to go to public shelters where known friends or relatives are also going, and to form groups or cliques within the shelters. Attempts will be made to perpetuate the interpersonal communications network which existed in the evacuated area.

(c) Within the public shelter, rumors will present a major morale problem because of the lack of a systematic feedback of information from the evacuated area.

(d) Mass media of communication tend to exaggerate the dramatic aspects of disaster. This distortion is an important factor in promoting high anxiety and low morale among evacuees. This situation is aggravated by the failure or inability of agencies to supply reliable information from the devastated area. The ill-defined conditions of the "home" area will result in premature attempts to return by evacuees, even in face of danger from health and/or accident hazards. This indicates that the task of achieving evacuation is not as great as that of controlling return to the devastated areas.

The items bearing on each hypothesis were listed on the schedules. Distributions of the various characteristics contained by each item were then cross-tabulated with those of another distribution and a statistical table was derived. Standard statistical tests were then conducted in order to obtain the significance of the associations which were revealed. These tables, and the tests of significance made on the basis of them, constitute the framework of this report. There are, of course, other and more subtly detailed analyses of the data which can and should be made. This report does not contain such analyses because of necessary limitations on time and funds. While it is hoped that further support will be given to obtain more refined information, it is felt that the tests herein applied to the hypotheses have served to demonstrate their degree of validity in a general sense.

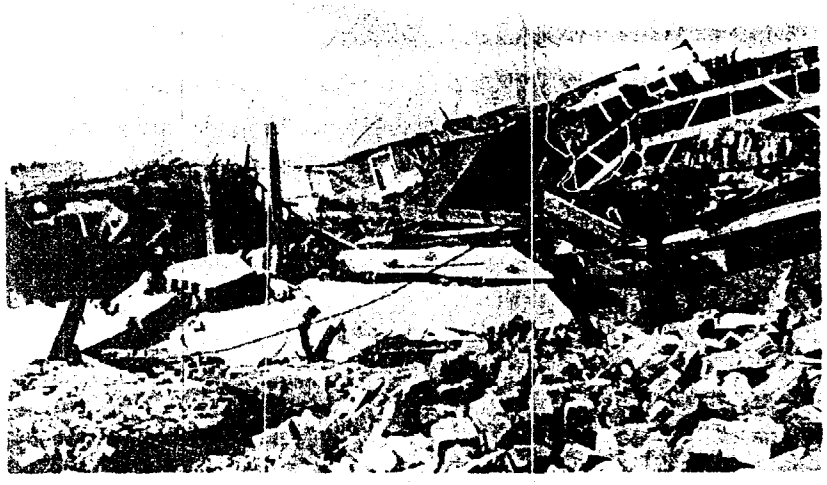

Photo from Frank Taylor, Galveston

Tornado Debris, Galveston

CHAPTER II

THE WARNING PROCESS

Introduction

In certain respects, the warning phase is the most important phase of any disaster. Events which occur during this phase determine the magnitude of the impact of the disaster. At the personal or family level—though not at the community level—proper warning may make the difference between avoiding a disaster or falling victim to it. As noted by Williams (1956):

> Warning is a function of utmost consequence for preventing and reducing the tragic effects of disaster. With warning, physical defenses—such as evacuation and shelter—are possible. With warning, advanced preparations for speedy rescue and relief are possible. With warning, post-impact confusion can be reduced. With warning, individual behavior probably will be more adaptive, and possibly the emotional after-effects will be less severe.

"While it may be possible to move out of the path of a disaster with sufficient warning, the disaster event itself is not subject to control. Those caught up in disasters find their usual behavior patterns ineffectual and suffer a high degree of frustration or drastically change their modes of behavior. At the community and institutional level, the effect is one of acute disorganization, induced by the necessity to perform functions well outside the usual on-going routine" (Moore, 1958, p. 310).

In order to place this study of Hurricane Carla in perspective, it is necessary to distinguish between hurricanes and other types of disasters, especially with respect to the warning and impact phases. Given the present state of our knowledge, warning is possible only for certain types of potential disaster situations. For present purposes, it is useful to classify disasters into two categories: (1) precipitate disasters, and (2) erosive disasters.

Precipitate disasters are exemplified by such catastrophic events as earthquakes, tornadoes, fires, explosions, various kinds of collisions involving ships, trains, and airplanes, and unanticipated attacks by a military foe. Because of their very nature, precipitate disasters do not permit an advanced or systematic warning. At best, the warning phase consists of an all-too-brief period during which some signs of impending disaster may be detected. Organized and systematic warning or alarm, however, do not occur.

Crescive disasters are exemplified by floods, famines, droughts, economic depressions, repeated or continued attack by an enemy, and hurricanes or typhoons. In all these cases, there is a period of time prior to impact for organized and systematic warning. Whether or not such warning actually occurs is dependent upon the level of technological development, the existence and complexity of a disaster culture, and the type of social organization of the threatened area. For example, a typhoon or hurricane may constitute a precipitate disaster in an area where the technology of weather forecasting is undeveloped, and where no system exists for communication of the warning.

It is probably true that where recurrent, crescive disasters occur in a given area, the warning technology and disaster culture are highly developed. Thus, if an area experiences a crescive disaster unusual to it, warning may not occur, even though sufficient time exists for it to take place. Obviously, then, precipitate and crescive disasters shade into one another. What is a crescive disaster in one society may be a precipitate disaster in another, depending upon the disaster culture involved. Likewise, the development of science and technology in a society may change the classification of a type of disaster from the precipitate to the crescive category.

Hurricanes provide an excellent example of how the whole meaning and character of a disaster-impact agent is a function of the development of culture. Due to the development of meteorology and of mass communications technology, hurricanes which once struck with little warning now occur only after a prolonged period of alert.

Hurricane Carla, which is the subject of the present study, cannot properly be compared to other disasters which are more precipitate in nature. The warning period for Carla was a long one. During this time, highly organized activities were directed toward spreading the alarm and toward encouraging protective behavior prior to impact. The Carla case clearly illustrates the propositions stated by Williams in the preceding quotation. It is in the distinctiveness of the warning period that the greatest contrast between hurricanes and other natural disasters may be found. Therefore, caution should be exercised in the

application of the conclusions presented in this study to other types of disaster situations.

Warning as a Process

As pointed out by Mack and Baker (1961), warning may be regarded as a process. According to them, (p. 5):

> A warning system consists of: (1) a perceived threat; (2) the sending of signals to individuals, groups, or social categories about (a) the threat and (b) what behavior will avoid it or reduce its hazards; (3) the receipt of the signal; (4) interpretation of it; and (5) action based upon it.

In this report, certain refinements of the Mack-Baker conception are utilized. The following phases of the warning process are discussed throughout this chapter: (1) detection, (2) prediction, (3) dissemination, (4) reception, (5) evaluation, (6) reinforcement, and (7) recall.

This is a study not only of warning but also of response to warning in a real disaster situation as contrasted with the response to false warnings. Hence actions that are clearly a part of the warning process are distinguished from actions that represent a response to warning. The warning itself is studied in this chapter. In the next chapter, the response to warning is discussed. Finally, the study is focused on decision-making in response to warning, and on the actions that result from decisions. For purposes of this report, therefore, warning is regarded as a process entailing the seven phases listed above.

The detection phase consists of the period during which various clues or signs are discerned and interpreted in order to detect the presence of a threat. In the case of hurricanes in particular, this phase of the warning period is crucial. The Weather Bureau is continuously at work collecting masses of data, through the use of a very complex technology and organization, for the purpose of detecting the presence of a disaster threat. Similar detection systems are involved in flood control and in air raid defense.

In the sense that early detection is decisive, and that elaborate technology and organization are involved in detection, hurricanes are comparable to nuclear attack. With respect to warning, the difference obviously lies in the time period that can be expected to elapse between

detection and impact. In hurricanes, a period of days exists between detection and impact; in nuclear attack, only minutes can be reasonably anticipated.

The prediction period is that interval of time during which a potential threat is kept under observation and attempts are made to forecast when, where, and with what force the impact will occur. Prediction makes all the difference between a general alarm and a specific one. It also makes the difference between realistic and economical preparation, and more theoretical and possibly more costly preparation. There are several important differences between a hurricane and a nuclear attack, aside from the time differences which obtain during the prediction period. However, in both cases there is a span of time during which signs are ambiguous and prediction is uncertain. In hurricanes the question is: Will the "tropical storm" become a "hurricane"? In nuclear attack the question is: Are the blips on the radar screen really enemy bombers or missiles?

The problems of prediction of hurricanes and nuclear attack diverge radically once these questions are answered. In the case of hurricanes, the course of the storm may be whimsical or erratic; but in any event, it is unguided by human intelligence and has no precise target that can be used to aid in predictions. As a consequence, prediction becomes a matter of tracking and continually narrowing the probable area of impact. Then, just prior to impact, prediction can be made with relative certainty. For this reason, warnings must be continually qualified by such phrases as, "if the storm continues on its present course, and at its present speed, it will . . . ."

In nuclear attack, prediction of the course and destination of missiles can be made with extreme accuracy. But the time period available for such predictions is extremely short, and may be even more curtailed as technology is further developed. Under such circumstances, warning can not be preceded by an information build-up which gradually prepares the population to take action. The warning must be precipitate and defensive action must be compressed into a very small segment of time.

The dissemination period is that time interval during which information about the possibility of impact is disseminated throughout the potential disaster area. This information could take the form of factual reporting of observations made about a possible disaster agent, or it could consist of evaluations in the form of a forecast of the disaster and warning about its probable ramifications. This information could also contain statements about what defensive actions are possible, or recommended, or even ordered.

The problems involved in the dissemination period concern: (1) the content of warning, (2) the timing of the warning, (3) the media of warning, and (4) the magnitude of warning. During this period, the agency with warning responsibility must decide what information to disseminate, when and to whom it will be disseminated, and what kinds of media will be utilized.

To a large extent, the alternatives open to the warning agency which makes these decisions are dependent upon the type of disaster involved. In the case of hurricanes, an appreciable time period exists for the dissemination of information about it. As a consequence, the use of mass media serve the purpose of spreading the warning since, during the long time interval, enough people will listen to radios, watch televised programs, or read newspapers to insure that the warning has been universally received. A more precipitate disaster, such as a nuclear attack, would probably require the use of some signal such as a siren to alert people to the need for action.

During the dissemination period, one of the most momentous decisions to be made is that regarding the substance of the warning. Are people to be given information that is not yet evaluated, and hence will they be expected to decide for themselves what it means and how they should act? Are they to be given highly evaluated information and advice as to how to act, or are they to be given authoritative orders as to what they should do? The issues that arise in the formation of such decisions are many. There are two, however, that are probably the most critical. The magnitude of the threat and the certainty of impact will probably determine the difference between the dissemination of unevaluated information at the one extreme and the issuance of authoritative commands at the other.

The evaluation period is that time interval following the reception of warning during which the recipients judge the significance of the warning for themselves. This period is included in the warning process since warning is a communications situation, and communication depends as much upon the receiver of a message as it does upon the sender. What may constitute a warning to one person may not to another. As a consequence, the evaluation period must be included in the warning process. Actually, since dissemination of information about hurricanes is continuous over several days, evaluation goes on as a dynamic process while predictions are narrowed and made more specific.

Reinforcement refers to the period during or after impact when it is necessary to continue warning people of the presence of danger. For example, in the case of Hurricane Carla, a half-million people

were evacuated in response to systematic and prolonged warnings prior to impact. Danger persisted for these evacuees even after impact, particularly if they returned to the disaster area. Consequently, continual warnings of the danger existing in the disaster area were necessary. A similar situation would presumably exist after a nuclear attack. In such an event, it would be necessary to continue to warn people of post-attack dangers to reinforce the defensive action taken in response to original warning.

Two interesting and challenging problems arise in connection with the reinforcement period of disasters. First, the impact of a disaster agent may destroy or seriously diminish the capacity to continue to disseminate warning information because of (1) destruction of the warning agency, (2) destruction of the warning media, and/or (3) dispersal of the warned population. Second, the organization and technology required for collecting information on post-impact danger may be quite different from that required to issue the original warning. For example, the Weather Bureau is well prepared to deal with hurricanes as meteorological events; it is not equipped to deal with them as disasters after impact has occurred. The Weather Bureau may go on tracking the course of a diminishing storm as it blows itself out (as it did Carla), and leave the assessment of the destruction it wrought to some other agency. Similarly, the early warning radar net may function well to warn of impending attack, but it would be useless for disseminating information about post-attack radiation danger and other post-attack hazards; this would become the task of NAWAS and other similar networks. It seems generally true that our disaster culture is at present best developed for dealing with warning prior to impact, and least developed for dealing with warning after impact. Certainly this is true of hurricane-type disasters. In the Carla situation many homeowners did not know they would not be permitted to return to their residences until they reached the roadblocks in the coastal areas. Even there they had no means of securing adequate, or accurate, information on the condition of their homes and home towns.

The final phase in the warning process, the recall period, occurs after the moment of impact and as the disaster agent moves on or diminishes in fury. If people are to be warned of impending danger, and of existing danger, they should also be told when the danger has ended and when defensive action is no longer required. This recall period consists of that time interval during which people decide individually, on the basis of various fragments of information gathered, that the danger is over; or when they are collectively told that it is over. Sometimes, as is frequently the case in hurricanes, the recall period is far less systematically handled than the dissemination period.

People are given fragmentary information about conditions in the disaster zone, or they determine what these conditions are through personal reconnaissance. In the case of conventional air raids such as those that occurred in the 1940's, the all-clear signal was as clear and definite as the warning of danger. In the case of hurricanes, and in the case of severe nuclear attack, when the radiation danger lingers on, an "all-clear" may never be sounded in any recognizable form. This point is given more detailed consideration elsewhere in the report.

This descriptive account of the warning process is used as a means of ordering the data to be presented in this chapter. A second means of systematizing the interpretation of results consists of testing of a number of hypotheses about warning which have been developed in previous disaster research. These hypotheses are presented as they apply to the various phases of the warning experience.

The Defection Period

The detection period for Hurricane Carla began on Sunday, September 3rd, when Weather Bureau search planes noted a "showery area in the Carribean" which showed signs of developing into a tropical depression. By Monday, continuous observation had revealed that a tropical depression had indeed developed, and winds were being recorded up to 40 miles per hour in passing squalls around the weather system.

From that time on, the Weather Bureau, through all means available to it, continuously collected data about the developing tropical depression. The initial work of detection had been done, but it was necessary to continue collecting and sifting data in order to determine if the storm would develop into a hurricane and eventually represent a threat to any populated area. For present purposes, the detection period may be said to have extended from the initial discovery of the "showery area" on September 3rd up to the time when a "Hurricane Watch" was established on September 7th.

During the intervening four days, the original "showery area" was described as a "tropical depression" on September 4th, "Tropical Storm Carla" on September 5th, and "Hurricane Carla" on September 7th.

Throughout the detection period, the Weather Bureau issued numerous bulletins and advisories which served to alert the Gulf Coast to the possibility of impending danger. There were 16 advisories issued between 8 p.m., September 4th, and 10 a.m., September 8th.

On September 8th a hurricane watch was extended from Appalachicola, Florida, to take in the entire Louisiana and Texas coast.

The Prediction Period

Virtually every advisory and bulletin issued after September 5th contained predictions about the storm. For example, at 11 a.m. EST, Tuesday, September 5th, Advisory Number 4 stated, "continual gradual intensification during the next 24 hours is indicated with no marked change in direction and rate of movement." Virtually the same prediction was included in the next several advisories. By September 7th, the Bureau was predicting entrance of Carla into the Gulf of Mexico, and tides five to seven feet above normal around the tip of Cuba. Higher than normal tides were predicted along the southwest Gulf Coast.

On the 8th of September, the prediction was: "Carla will continue to move into the Gulf of Mexico with no marked change in direction and rate of movement for the next 12 to 18 hours." Warnings to small craft and all vessels in the path of the hurricane were being issued regularly at this time.

The first more or less formal warnings came to the residents of the Gulf Coast through Advisory Number 16, on September 8th, at 10 a.m. CST. It read, "All persons should be ready to take necessary precautions when [hurricane] warnings are hoisted. All residents of islands and low coastal areas, especially along the Louisiana and upper Texas Coasts where escape routes can be flooded by high tides, should watch the rising tides and move to higher grounds before routes are closed."

By 1 p.m. September 8th, the course of the storm had shifted westward, and the hurricane watch was lifted east of the Mississippi. Persons in western Louisiana and along the Texas coast were again warned to prepare for possible evacuation of low-lying areas.

Thus far, no prediction had been made concerning the area along the Gulf Coast over which the storm was likely to pass on its inland course. The first such prediction was contained in Advisory Number 20 on Saturday, September 9: "Present indications are that it [Carla] will gradually turn to a more northerly course with the center moving inland on the upper Texas or extreme western Louisiana Coast Sunday." The same advisory contained the first direct advice to evacuate. It said, "all persons should evacuate all islands and low coastal areas on the Louisiana and upper Texas coast immediately. Preparations against these dangerous winds and tides should be started immediately and completed tonight to insure safety of persons, animals and property."

It was at this point that Carla began to delay her inland movement. She stood virtually stationary off the coast for almost 24 hours. New predictions were not made as to where she would cross the coast. Instead, the Weather Bureau reported her movements very accurately and continued warning low-lying areas to evacuate. Bulletins on September 10th carried the following repeated warning: "If evacuation of all islands and low coastal areas along the Louisiana, the upper and central Texas Coasts has not been completed, evacuation should be hastened before it is too late."

The Dissemination Period

It is apparent that dissemination of information and of warnings began immediately upon detection of the "tropical depression." The prediction process was continuously modified, and new predictions were disseminated whenever necessary. Throughout the mass media, there was a gradual focusing of attention on the storm as conditions became more critical and as predictions indicated that the Gulf Coast was in danger. All television and radio stations along the Gulf Coast regularly reported the Weather Bureau bulletins and advisories over the air. They also began to present news reports based on observations made by reporters and eye witnesses along the coast. By Saturday, September 9th, hurricane news and reporting had pre-empted the broadcasting time of other programs on most radio stations, and a large proportion of television time was devoted to hurricane news. Those programs that were broadcast on schedule were subjected to continual interruptions for spot reports and announcements about the hurricane. Announcements pertaining to the location of civil defense and Red Cross shelters and reception centers began to accompany Weather Bureau bulletins and advisories, and news reports.

The Reception Period

The 1,534 respondents interviewed for this study were asked when and from what source they first heard about the storm. Their responses are presented in Table 2.1. Thirty per cent heard about the storm at least five days before it reached its height in their particular areas. Over 80 per cent of them heard about it three or more days before impact. Not even one per cent of the respondents had less than one day in which to prepare for it. The three per cent in the "other" category represent both people who were away from home when the storm occurred and people who could not answer the question in terms of time. Table 2.1 illustrates the fact that, in contrast to many other disasters, and among them some hurricanes, warnings about Hurricane Carla were received very early. Thus a substantial

amount of time was provided for the preparation of protective action. Only one person out of the total sample reported that he never heard a storm was approaching until it struck, and only six persons stated that they received less than twelve hours' warning.

Table 2.1. When Did You First Hear that a Storm Was Threatening?

Days or Hours before Impact	Number of Respondents	Per Cent
5 days before impact	466	30.3
4 days before impact	345	22.5
3 days before impact	459	29.9
2 days before impact	169	11.0
1 day before impact	28	1.8
12 Hours or less before impact	6	0.4
Never heard	1	0.1
Other	50	3.3
No answer	11	.7
Total	1,534	100.0

The various sample areas differed somewhat in the amount of time they were given for preparation. In general, as shown in Table 2.2, those further east along the coast reported hearing about the storm a shorter time before impact than the others, though the differences are not very great.

Table 2.2. Time Interval between First Warning and Impact, in Percentages

	Sample Area				
Period of Time	Baytown	Calhoun County	Cameron Parish	Chambers County	Galveston
5 days	31	42	22	34	24
4 days	21	24	27	25	21
3 days	28	20	38	26	36
2 days	15	7	7	6	13
1 day or less	2	1	4	2	3
Other or no answer	1	5	2	8	3
Total Per Cent	100	100	100	100	100
Total Number	504	200	208	221	401

In Cameron Parish, located in the most eastern portion of the area, 38 per cent of the respondents reported that they heard about the storm only three days in advance, as compared to a corresponding 20 per cent in Calhoun County, located in the extreme western edge of the sample area. The data for Galveston, the other coastal area where tides rose early, also report a high proportion (36 per cent) of people who heard about the storm only three days ahead of time.

The vast majority of respondents obtained news of the hurricane from either radio or television reports. These two media accounted for 88 per cent of the total responses to the question, "How did you first get news of an impending storm?" Table 2.3 contains a distribution of the respondents based on their reports of the source of first warning. It may be seen that less than 10 per cent of the respondents received their first report of the storm from sources other than the mass media. The various sample areas showed little difference in their responses to this question. However, there was greater or less reliance on television as opposed to radio, depending upon the area involved.

Table 2.3. How Did You First Get News of an Impending Hurricane?

Source of Warning	Number of Respondents	Per Cent
Television	847	55.2
Radio	500	32.6
Newspaper	50	3.3
Friend	39	2.5
Neighbor	24	1.6
Relative	22	1.4
Weather Bureau (direct)	14	.9
Local official	6	.4
Other	25	1.6
No answer	7	.5
Total	1,534	100.0

When respondents were asked what sources of information about the hurricane they rated the highest in reliability, the majority (61 per cent) said television. Radio ranked next (29 per cent), and newspapers next (two per cent). Word-of-mouth ranked lowest (one per cent). These data, tabulated in Table 2.4, probably reflect "dependence on" more than "reliability attributed to."

Table 2.4. Media Considered Most Reliable as Warning Source

Most Reliable Source of Warning	Number of Respondents	Per Cent
Television	936	61.0
Radio	455	29.7
Newspaper	24	1.6
Word-of-mouth	16	1.0
Other	59	3.8
No answer	44	2.9
Total	1,534	100.0

Some interesting area differences appear in regard to the ratings of reliability of news sources. The percentages of respondents from each area who rated various news sources as first in reliability are contained in Table 2.5.

Table 2.5. Percentage of Respondents Who Rated Various News Sources as First in Reliability, by Sample Area

Source of Warning	Baytown	Calhoun County	Cameron Parish	Chambers County	Galveston
Television	76	31	66	66	51
Radio	19	52	24	29	34
Newspaper	1	*	2	*	3
Word-of-mouth	*	2	2	*	1
Other	2	11	3	3	4
No answer	1	4	2	*	6
Total Per Cent	100	100	100	100	100
Total Number	504	200	208	221	401

*Less than .5 per cent

In every area except Calhoun County, television was rated as the most reliable source of news. In Calhoun County 52 per cent rated radio as the highest (11 per cent said other) news source. This difference very probably is accounted for by difficulties encountered in television reception in Calhoun County due to its distance from a TV station. Problems in television reception were not encountered in other areas.

Respondents were also asked how carefully they followed the course of the storm on television and radio. Table 2.6 indicates the majority of respondents reported that they followed it carefully or very carefully. Only eight per cent said they did not do so.

Table 2.6. Per Cent of Respondents Giving Various Answers to the Question, "How Carefully Did You Follow the Course of the Storm After You Heard About It?"

Degree of Care in Following Storm	Number of Respondents	Per Cent
Very carefully	1, 151	75.0
Carefully	260	16.9
Not very carefully	86	5.6
Hardly at all	33	2.2
No answer	4	.3
Total	1, 534	100.0

When the sample areas are compared (see Table 2.7) on the basis of how carefully the storm was followed, certain differences appear. It is interesting to note that Cameron Parish and Chambers County, the two sample areas most alike, are similar in that respondents gave considerable attention to the course of the storm. In Cameron Parish, 80 per cent, and in Chambers County, 87 per cent, of all respondents reported they followed the storm very carefully. Respondents in the other areas seem to have given somewhat less attention to the storm. It is interesting to note that the respondents from Calhoun County, over which the eye of the storm passed, showed the lowest attention rate. Actually, Table 2.7 indicates that there is an inverse relationship between the care in following the storm and how close the eye of the storm came to the area involved. This may be due to the fact that, for a period of a day, the Weather Bureau predicted the storm would pass over the eastern coast of Texas or the western coast of Louisiana. It may also be a result of the unhappy experience of Cameron Parish residents with Hurricane Audrey in 1957.

Mack and Baker (1961) predict that "small-town residents or urbanites with small-town background are less likely to interpret a signal as valid than are residents of large cities." One indication of how seriously a warning is taken, is how closely people pay attention to it. If the data cited herein are arranged in rural and urban categories, they can be used as a test of the Mack-Baker hypothesis.

Table 2.7. Degree of Care in Observing the Storm Classified by Sample Area

Miles from Impact	115	0	210	135	115
Care in Observing Storm	Baytown	Calhoun County	Cameron Parish	Chambers County	Galveston
Very carefully	76	63	80	87	71
Carefully	15	27	18	8	18
Not very carefully	6	8	1	4	7
Hardly at all	2	2	0	2	4
Total Per Cent	100	100	100	100	100
Total Number	504	200	208	221	401

Two completely urban and two completely rural samples are provided by the data. Cameron Parish and Chambers County are completely rural; Baytown and Galveston are completely urban. Calhoun County is mixed. When the urban and rural samples are compared (see Table 2.8), it is found that the reverse of the Mack-Baker prediction holds true.

When a Chi Square test is applied to Table 2.8, it is found that urban and rural respondents differ significantly from each other on this question. The difference, however, is in the opposite direction from that predicted. Consequently, the validity of the Mack-Baker hypothesis is suspect. These data show that rural people paid more attention to the warnings as measured by their attention to following the storm. However, it must be added that since the difference displayed by our data is an urban-rural one, while that found by Mack-Baker is between large and small cities, this test of the validity of their hypothesis is not adequate.

The Evaluation Period

When asked whether they felt that the full force of the storm might strike their locality, respondents from the various areas answered as shown in Table 2.9.

It will be noted that the greater the distance from the eventual impact area, the more people there were who thought the storm would hit them with full force. It may be postulated that the belief that the storm will hit with full force is evidence that the warning is accepted as valid. By this means, the Mack-Baker hypothesis concerning

Table 2.8. Rural-Urban Differences in the Degree of Care in Following Storm

	Type of Area		
	Urban Per Cent	Rural Per Cent	Total Per Cent
Observed carefully or very carefully	90.6	96.8	92.5
Did not observe carefully	9.4	3.2	7.5
Total Per Cent	100.0	100.0	100.0
Total Number	904	409	1,313

Table 2.9. The Percentage of Respondents from Each Sample Area Who Said "Yes" and "No" to the Question: "Did You Think the Full Force of the Storm Would Strike Your Area?"*

Sample Area	Miles from Where Eye Passed Inland	Yes	No	No Ans.	Total Per Cent	Total Number
Baytown	115	75	24	0	100	504
Calhoun County	0	64	36	0	100	200
Cameron Parish	210	88	11	0	100	207
Chambers County	135	78	22	1	100	222
Galveston	115	67	30	3	100	401
Total		74	25	1	100	1,534

*Galveston, being on the coast, is placed closer to impact than Baytown, although the actual distance to the main impact area was the same for the two areas.

rural-urban differences may be tested through these data. The results of this test are reported in Table 2.10.

Respondents differed in their expectation that the storm would strike their area in that more rural than urban people were of this opinion. However, the fact remains that most of the respondents in both categories felt that the storm would strike their area.

Similar results were obtained from a question asking whether respondents felt their families might be in danger. Slightly over half

Table 2.10. Rural-Urban Differences in Answering the Question, "Did You Think the Full Force of the Storm Would Strike Your Area?"

Answers	Type of Area: Urban Per Cent	Type of Area: Rural Per Cent	Total Per Cent
Yes	72.6	82.9	75.9
No	27.4	17.1	24.1
Total Per Cent	100.0	100.0	100.0
Total Number	891	416	1,307

(55 per cent) of all respondents answered "yes" to this question. The results from the five sample areas are contained in Table 2.11. Here again, the rural-urban difference noted above, and the inverse relationship between closeness to impact and concern over danger, are clearly apparent.

Table 2.11. Per Cent of Respondents from Various Areas Who Answered Yes and No to the Question, "Did You Feel That You and Your Family Might be in Serious Danger?"

	Miles from Where Eye Passed Inland	% Yes	% No	% No. Ans.	Total Per Cent	Total Number
Baytown	115	49	27	24	100	504
Calhoun County	0	48	20	32	100	200
Cameron Parish	210	81	14	4	100	208
Chambers County	135	57	22	21	100	221
Galveston	115	53	31	16	100	401
Total		55	25	20	100	1,534

Tables 2.8, 2.9, 2.10, and 2.11 all demonstrate that the people in rural areas were generally more concerned about the warnings they received than were respondents from cities. Since the two cities were somewhat closer to the eventual point of impact than were the rural counties, proximity to danger cannot be cited as an explanation for the observed difference. However, proximity to danger was not constant. The Weather Bureau announced on September 9th that the area in which both Cameron Parish and Chambers County are located probably would be the point over which the eye of the storm would pass. For at least two days thereafter, the behavior of the storm was such that this possibility prevailed. During this same time, it seemed likely that the area over which the eye eventually did pass would escape the full force of the storm.

It should also be recalled that the eastern coast of Texas and the western coast of Louisiana, which include the two rural samples for this study, were the areas devastated by Hurricane Audrey in 1957. This probably accounts for some of the rural-urban differences observed.

In view of the presence of these confounding factors, the Mack-Baker hypothesis concerning rural-urban differences cannot be rejected. Neither can it be accepted. Actually, Mack and Baker made their prediction about people living in cities who had rural (as opposed to small town or city) backgrounds. Their reasoning was that people with rural backgrounds are less accustomed to dealing with or responding to bureaucratic or formalized communications, and therefore they would be less likely to respond to warnings issued by such sources.

A strong case can be made, however, for predicting that a hurricane—especially when it occurs in a low-lying coastal region—will be a greater threat to open-country residents and farmers than to city dwellers. In the open country, people and buildings are more exposed. There is greater danger of being cut off from the outside world and, in case of injury, help is further away than it is in cities. Furthermore, ownership of livestock and of farm buildings and machinery may make an impending hurricane a greater financial threat to rural people. On the basis of these considerations, it is hypothesized that open-country residents pay more attention to warnings, and are more apt to act on the basis of them, than residents of cities. The data presented herein seem to make this hypothesis worthy of further testing, despite the fact that it differs from the Mack-Baker proposition on the same subject.

Respondents were questioned about their attempts to verify the validity of warnings received through mass media and by word of mouth. Three fourths of the respondents reported that they did nothing to verify the reports they had received. Table 2.12 shows that although 55 per cent of the respondents reported receiving their first hurricane warning over television, only 13 per cent attempted in some way to verify this information.

Table 2.12. The Percentage of Respondents Who Made Attempts to Verify the Accuracy of Warnings Showing the Percentage That Reported Receiving First Warning Over the Same Media

Source of Warning Checked	No. of Respondents	Per Cent That Verified Warning	Per Cent That Received First Warning by Media
Yes, checked T. V. report	203	13.2	55.2
Yes, checked radio report	59	3.8	32.6
Yes, checked other report	108	7.0	11.7
No, didn't check	1,157	75.4	--
No answer	7	.5	.5
Total	1,534	100.0	

Similarly, of the 33 per cent who received radio warnings first, only four per cent attempted verification. These figures suggest that proportionately more viewers than radio listeners made verification attempts, and this is confirmed by the data in Table 2.13.

Table 2.13. Percentage That Attempted Verification of Reports from Mass Media

	Radio	T. V.
Number who received first warning by media	500	847
Number who attempted verification of reports	59	203
Percentage that attempted verification of reports	11.8	24

These findings may be attributed to differences in the socio-economic status of radio as opposed to television audiences. The data, however, do not permit a direct testing of this assumption.

Type of Warning

An effort was made to determine respondents' perceptions of the nature of the warning they received. As already noted, the Weather Bureau repeatedly advised people in exposed areas to evacuate. Only in Cameron Parish, however, was a general evacuation order issued, though our data make it apparent that in all sites some persons believed they had received such orders and acted in terms of that belief. Respondents were asked, "Were you at any time ordered or advised to evacuate?" The results, classified by areas are tabulated in Table 2.14.

Table 2.14. Percentage of Respondents from Each Area Giving Various Answers to the Question, "Were You at Any Time Ordered or Advised to Evacuate?"

Area	Yes, Ordered	Yes, Advised	No, Neither	No Answer	Total	Number
Baytown	*	6	92	2	100	504
Calhoun County	2	34	64	*	100	200
Cameron Parish	14	65	17	3	100	208
Chambers County	5	24	71	*	100	221
Galveston	3	31	63	3	100	401
Total	4	27	68	2	100	1,534

*. 5 per cent or less

In all areas except Cameron Parish, the majority of respondents said they were neither ordered nor advised to evacuate. Even in Calhoun County, over which the eye of the storm passed, 64 per cent of the respondents gave this answer. Only in Cameron Parish did a significant proportion of respondents report being "ordered to evacuate" (14 per cent).

The number and proportion of people in the sample from each area who evacuated, contrasted with the number and proportion who

said they received advice or orders to evacuate, are given in Table 2.15. A direct relationship is seen to exist between evacuation and the advice or orders to evacuate.

Table 2.15. Comparison of Evacuation Rate with Advice or Orders to Evacuate

Area	Evacuees		Ordered or Advised	
	Number	Per Cent	Number	Per Cent
Baytown	199	39.5	34	6.7
Calhoun County	178	89.0	71	35.5
Cameron Parish	201	96.6	172	79.3
Chambers County	145	65.6	63	28.5
Galveston	268	66.8	137	34.1

In order to determine whether respondents reacted to warning in terms of a systematic evacuation plan, they were asked: "So far as you know was there a local plan for evacuation?" Table 2.16 contains the distribution of responses to this question.

Table 2.16. So Far as You Know, Was There a Local Plan for Evacuation?

Area	Yes %	No %	Don't Know %	No. Ans. %	Total Per Cent	Total Number
Baytown	16	66	17	1	100	504
Calhoun County	29	60	10	1	100	200
Cameron Parish	61	22	17	0	100	205
Chambers County	33	55	11	1	100	221
Galveston	49	35	13	3	100	401
Total	35	49	14	2	100	1,531

In only one area, Cameron Parish, did the majority of respondents say there was a plan for evacuation. In other areas, less than half of the respondents knew of such a plan.

Cameron Parish is unique in this respect: In that area, an elaborate plan of evacuation had been worked out shortly after Hurricane Audrey in 1957. This plan had been highly publicized. Neighborhood civil defense groups had been established and had been meeting regularly for three years. Nevertheless, 39 per cent of the respondents from Cameron Parish said that no evacuation plan existed, or that they did not know of one. It is difficult to imagine how a plan of evacuation could be more publicized and more actively prepared than that for this area. Nevertheless, a substantial proportion of the population remained unaware of it. Despite these considerations, Cameron Parish had the highest evacuation rate for Hurricane Carla Only three per cent of the respondents who were questioned did not evacuate.

There appears to be a relationship between knowledge of, or belief in, the existence of an evacuation plan and rate of evacuation. Table 2.17 shows the rate of evacuation compared to the proportion of respondents who said there was an evacuation plan. If Calhoun County, which received the greatest impact of the hurricane, is removed from Table 2.17, the rate of evacuation and the rate of knowledge about evacuation plans are seen to be directly related.

Table 2.17. Rate of Evacuation Compared to Knowledge of Evacuation Plans

Area	Per Cent Evacuees	Per Cent That Knew of Plan
Baytown	39.5	16.1
Calhoun County	89.0	28.5
Cameron Parish	96.6	60.6
Chambers County	65.8	33.5
Galveston	66.8	48.9

Relationship of Evacuation Behavior to Warning

In Chapter One, several hypotheses are stated concerning the relationship between warning and evacuation behavior. These hypotheses can be tested using the data at hand.

Hypothesis I. The communication medium carrying the warning is associated with the decision to evacuate. Warnings were received by people in the threatened area through various means. This hypothesis states that there is an association between the source through which the first warning is received and whether or not people decide to evacuate. Table 2.18 shows the number of respondents who engaged in various post-warning activities, classified by the source of warning. The post-warning activities listed are: (1) left the community, (2) stayed in home, (3) left home and stayed with a friend in the same community, (4) stayed in a public shelter in the threatened community, and (5) stayed in a public building in the same community.

As already noted, an overwhelming majority of respondents received the warning for Carla over television or radio. Only 177 of the 1,534 respondents reported that they received the first warning through other means. Due to this fact, before Hypothesis 1 could be tested the data in Table 2.18 had to be reclassified by combining categories. First, the source of warning was broken down into mass media—television, radio, newspaper, and other. Then the post-warning behavior was reclassified into three categories: (1) left the community, (2) stayed in the community but left home, and (3) stayed in home. The categories labeled in Table 2.18 as "Stayed with friend," "Stayed in public shelter," and "Stayed in public building" are included in category (2), "Stayed in the community but left home." Table 2.19 presents the results of combining these categories.

When Chi Square was used to test the association between source of warning and evacuation behavior on the basis of the data in Table 2.19, a value of 4.06 was obtained. This value is not significant with two degrees of freedom. Therefore, when mass media are compared to other warning sources, no significant difference in evacuation behavior is found.

However, close examination of Table 2.18 will reveal that television and radio appear to differ in the amount of evacuation they induced. For example, 62 per cent of the "stay-at-homes" were television viewers, as compared to 27 per cent who were radio listeners. In order to test the possible difference between television and radio as a source of warning, Table 2.20 was constructed. This table indicates

Table 2.18. Post-Warning Behavior Classified by Warning Media

Post-Warning Behavior of Respondents

Source of Warning	No Ans. %	Left Comm. %	Stayed Home %	Stayed with Friend %	Stayed in Public Shelter %	Stayed in Public Building %	% of Total Number	Number in Each Category
No answer		1					.5	7
T. V.	58	49	62	63	53	52	55.2	847
Radio	26	39	27	20	35	36	32.6	500
Newspaper	5	3	4	3	4	3	3.3	50
Friend	11	2	3	3	3	2	2.5	39
Neighbor		2	1	3	1	2	1.6	24
Relative		2	1		1	1	1.4	22
Directly from Weather Bureau not over radio, T. V.		1	1	3		1	.9	14
Local official		1			1		.4	6
Other		1	1	6	1	2	1.6	25
Total	100	100	100	100	100	100	100	Total N
Number in each category	19	658	525	121	75	136	1,534	1,534

Table 2.19. Evacuation Behavior Classified by Warning Media

	Source of Warning		
Disaster Behavior	Mass Media %	Other %	Total
Left community	43	45	43
Left home, but stayed in community	22	27	22
Stayed home	35	28	35
Total	100	100	100
Number	1,380	128	1,508

that of those who received their first warning over television, 39 per cent stayed home, while only 28 per cent of the radio listeners remained at home. A Chi Square of 25.33 with four degrees of freedom was obtained from this table. This figure means that a significant relationship does exist between warning media and evacuation behavior, at the .001 level. An examination of Table 2.20 reveals that proportionately more people received their warnings from television, but that relatively fewer of them evacuated.

Table 2.20. Evacuation Behavior Classified by Warning Media

	Source of Warning			
Evacuation Behavior	Television %	Radio %	Other %	Total %
Left community	38	51	44	43
Left home, but stayed in community	23	20	25	22
Stayed home	39	29	31	35
Total Per Cent	100	100	100	100
Total Number	836	495	177	1,508

When this analysis is compared with that of Table 2.19, the conclusion is reached that the net effect of the mass media does not differ from word-of-mouth or other types of warning, but that among the mass media, radio seems to produce a greater evacuation effect than television.

It is possible that socio-economic factors are responsible for this difference. The television viewer may occupy a different socio-economic status from that of the radio listener. Since social class may be a decisive factor in evacuation behavior, this difference may be explained in terms of social class. This question is examined elsewhere in the report.

Respondents were asked whether or not they checked the accuracy of the reports they received of an impending storm. Table 2.21 contains information concerning the relationship between the evacuation behavior of the respondents and their investigation into the accuracy of warning.

Table 2.21. Evacuation Behavior Classified by Attempts to Check Accuracy of Warnings

	Checked Accuracy of Warning		
	Yes	No	Total
Evacuation Behavior	%	%	%
Left community	26	52	43
Stayed in community but left home	47	10	22
Stayed home	27	38	35
Total Per Cent	100	100	100
Total Number	504	1,011	1,515

Checking the warning information appears to have made the difference between evacuating and not evacuating. As shown in Table 2.21, 27 per cent of those who checked reports stayed home, as compared to 38 per cent of those who did not check reports. A Chi Square of 286.45 was obtained from this table, which is significant at better than the .001 level of significance. This means that a relationship does exist between checking the accuracy of reports and evacuation behavior. The major factor contributing to the relationship reflected in this Chi Square lies in whether, in evacuating, a person left the community or merely left his home. Apparently, a greater proportion of people who checked the accuracy of reports did leave their homes, but remained in their own community. Of those who checked the accuracy of warning, 47 per cent left their homes but stayed in the community, whereas only nine per cent of those who did not check accuracy exhibited this same evacuation behavior. These facts seem to indicate that checking the accuracy of reports of danger leads to a reduction in anxiety.

Mack and Baker (1961) suggest that the response to warning depends far less on the objective situation of danger than it does on beliefs as to how much danger exists. Earlier it was noticed that a relationship exists between respondents' opinions about whether the full force of the storm would hit their area and the distance of that area from the center of actual impact. The further an area was from the impact center, the greater was the proportion of respondents who were certain that the full force of the storm would strike it. Mack and Baker maintain that people respond to their opinions of danger, regardless of the amount of danger that actually exists. The hypothesis could be stated that when people believe they are in danger, whether they actually are or not, they will respond wi h defensive action. If they do not believe they are in danger, although they actually are, they will not act defensively. Table 2.22 presents a tabulation showing evacuation behavior classified by opinions about danger.

Table 2.22. Evacuation Behavior Classified by Opinions of Danger

	Opinion of Danger: Believed Full Force of Storm Would Strike		
Evacuation Behavior	Yes %	No %	Total %
Left community	46	36	44
Stayed in community but left home	22	20	21
Stayed home	32	44	35
Total Per Cent	100	100	100
Total Number	1,121	378	1,499

As can be seen from Table 2.22, most people thought the full force of the storm would strike them. However, a greater proportion of those who thought it would than of those who thought it would not, left the community (46 per cent as compared to 36 per cent). A Chi Square of 17.78 with two degrees of freedom, which is significant at the .01 level, was obtained from this table.

Despite the fact that believing the storm would strike and checking the accuracy of reports are associated with evacuation, the care with which people followed the storm is not associated with evacuation. When Table 2.23 was used, as a basis of a Chi Square test, a value of 2.57 with two degrees of freedom was obtained. This is not statistically significant.

Table 2.23. Evacuation Behavior Classified by Degree of Care in Following Storm

Evacuation Behavior	Kept Up with Storm: Carefully %	Kept Up with Storm: Not Carefully %	Total %
Left community	44	38	43
Left home, stayed in community	21	27	22
Stayed home	35	35	35
Total Per Cent	100	100	100
Total Number	1,394	117	1,511

Hypothesis 1, which is stated in Chapter One, predicts that people will respond more favorably to warnings given by local authorities than to those emanating directly from the Weather Bureau or heard over radio or television news broadcasts. As already noted, most respondents received warnings from the mass media. Only three per cent received warnings from other sources, such as telephone, house calls, sound truck, etc. The Weather Bureau was almost universally cited as the authority for warnings. As a consequence, a direct test of this hypothesis is not possible in the case of Hurricane Carla. An indirect test is possible, however, by examining the evacuation behavior of people who reported that they were ordered or advised to evacuate. These respondents were asked who ordered or advised them to leave. Their responses are delineated in Table 2.24.

Table 2.24. Evacuation Behavior Classified by Source of Orders or Advice

Source of Orders or Advice	Per Cent of Respondents Who: Left Community	Left Home, Stayed in Community	Stayed Home	Total: Per Cent	Total: No.
Public officials	81	14	5	100	123
Civil defense	58	26	16	100	217
Other	58	33	10	100	116

Table 2.24 yields a significant Chi Square (26.0, 4df.), indicating a relationship between the source of orders or advice to evacuate and evacuation behavior. Examination of this table reveals that when orders or advice were issued by public officials other than civil defense officials, 81 per cent evacuated the community, and 14 per cent their homes. Only five per cent failed to respond. These data are in contrast to 29 per cent of those warned by civil defense officials who did not respond. Of the civil defense warnees, 58 per cent left the community, and 26 per cent left home for some type of shelter in the community. Other sources of warning, which include Red Cross, federal officials, and miscellaneous sources, were slightly more effective than civil defense in motivating people to evacuate.

Since the public officials category is composed primarily of local officials, these data tend to confirm the hypothesis under consideration. Of the 123 persons claiming to have been ordered or advised to evacuate by public officials, only five said the person warning them was a state official. For the remaining 118, the warning was issued by city or county officers.

Caution must be exercised in interpreting these results. In many cases, these local authorities have a dual role, one as an official with "normal duties," and the other as a civil defense official. Some of the persons claiming to have been warned by local officials undoubtedly were warned by them in their capacity as civil defense officers. This is clearly evident in the data for Cameron Parish, where more is known than elsewhere about exactly what happened during the warning process. In Cameron Parish, 41 per cent of the respondents who said they were warned or advised to evacuate said they were warned by the civil defense agency. However, 19 per cent said they received the order or advice from the sheriff. The sheriff in Cameron Parish is the chief of the civil defense police force, and controls the civil defense radio network from his office. A warning from the sheriff is, therefore, the same as a warning from civil defense. On the other hand, some civil defense personnel are not local officials. It may be that when a warning is received from these people, it is not taken as seriously as a warning from the civil defense officer who is also a public official. These data do not provide for further refinements of an interpretation of the research findings.

Hypothesis 1 also states that "Elected officials are reluctant to associate themselves with an order or even specific advice to evacuate." This hypothesis was drawn from the study of Hurricane Barbara reported by Rayner (1953) and from observations made by Bates et al. (1962) in a study of Hurricane Audrey. The data obtained from interviews regarding Hurricane Carla do not supply information which would permit testing of this part of Hypothesis 1.

There are, however, a number of facts which emerged from direct observation during the storm and from informal interviewing of officials afterwards, which tend to support this hypothesis. For example, in one of the sample areas, local officials hesitated to issue specific advice or orders to evacuate until they were certain that either the majority of the people were already leaving or had voluntarily evacuated. An order to evacuate was issued, but only after the evacuation was a virtual fait accompli. Since the Weather Bureau issued specific advice for people in low-lying coastal areas to evacuate, this relieved local officials of taking specific advisory responsibility. Thus, these officials had the option of either merely reiterating Weather Bureau reports or saying nothing. There is no direct evidence in these data that elected officials delegated the responsibility for ordering or advising evacuation to non-elected officials.

Hypothesis 1 also contains the statement that, "Where there was a definite local plan for issuing warnings and evacuation advice or orders, and this plan was executed, evacuation was more orderly and complete." Of the sites studied, Cameron Parish supplies the most critical test of the validity of this hypothesis as stated. Here the experience with Hurricane Audrey in 1957 led to the establishment of an elaborate civil defense organization oriented primarily to dealing with hurricanes. During the Hurricane Carla emergency these civil defense plans were put into operation. Within eight hours, evacuation of the danger area near the coast was virtually complete. Eventually 94 per cent of the people evacuated the parish and three per cent evacuated their homes for safer places within the parish. Only three per cent remained in their homes. Of the other sites studied by us, the only one with an evacuation rate approaching that of Cameron Parish was Calhoun County, the point of maximum impact. There, 85 per cent left the community and four per cent left their homes for other shelter within the community.

Evacuation Orders and Advice

The most vital decision that state and local officials have to make in an emergency of the magnitude of Hurricane Carla is whether or not they should order or advise people to evacuate. The consequences of making the "wrong" decision may be extremely grave. On the one hand, if no evacuation advice or orders are issued, people may be trapped in their home communities to suffer injury and death. On the other hand, if people are ordered or advised to evacuate, and the emergency proves less serious than was expected, officials are likely to be severely criticized for giving bad advice or issuing unwarranted orders.

The role of officials is further complicated by the fact that the limits of official authority with respect to disasters are not clearly defined. At the level of local government, it is apparent that there is a diversity of opinion as to whether or not local officials have the right to order people to evacuate and to enforce such orders with police powers. This is extremely important since national civil defense policy—and the policy of some states—is that local officials should make such decisions.

The case of Hurricane Carla provides an interesting example of the variations in practice with respect to ordering or advising evacuation. In Louisiana, the decision was made by the Governor to order evacuation in areas of severe threat, and where necessary to enforce the order with police power (Treadwell, 1962). The opposite policy was followed in Texas. At no time did a state official in Texas call for evacuation. According to Treadwell (1962), "It was felt that local officials and the Weather Bureau best knew the situation, and that a widespread call might set off panic or unnecessary movements. All decisions to evacuate or remain were made locally."

The decision to use police powers to enforce evacuation in Louisiana was strongly influenced by the experience of Cameron Parish with Hurricane Audrey in 1957. At that time no systematic evacuation took place. Nearly five hundred lives were lost and untold property damage was suffered. Treadwell quotes a spokesman for the Governor's office as saying, "Everybody was galvanized into action by the memory of Audrey." The Governor himself said, "If necessary, those who face immediate danger from this hurricane will be removed by the National Guard in order to prevent a repetition of the tragedy caused by Hurricane Audrey" (Treadwell, 1962).

Even though these sentiments were expressed at the state level in both Texas and Louisiana, the actual ordering or advising of evacuation was an affair of local government. Of the five sample areas studied, in only one, Cameron Parish, were actual orders issued for people to evacuate. Even in this case, no effective order was issued commanding people to leave, since the majority left without having to be told to do so by parish officials or by civil defense. As indicated in Table 2.14, only 14 per cent reported that they had been ordered to leave. A larger proportion, 17 per cent, said that they had been neither ordered nor advised to evacuate. Baytown offers a sharp contrast to Cameron Parish in this respect. In Baytown, over 90 per cent reported they had been neither ordered nor advised to leave their homes. Even so, almost 40 per cent did evacuate.

The figures in Table 2.14—especially those for Cameron Parish where it is known that evacuation was ordered by local authorities—rais

an interesting point. That is, whether a communication is perceived as an order, as advice, or simply as warning information, depends upon more than the decision on which the communication is based. For one thing, it appears that local authorities first advised people to leave. If they did not act upon that advice, they were then urged more strongly. Only as a final resort were they actually ordered to evacuate.

One reason for caution on the part of local authorities in ordering evacuation is a belief that a large proportion of their constituents question their right to issue evacuation orders. Texas state police say no such right exists, short of martial law. Some elected officials appear to be afraid that votes will be lost if they order an evacuation which later appears to the voters of their area to have been unwarranted.

Respondents who said they had either received orders or advice to evacuate during Hurricane Carla were asked whether they thought people should be ordered to evacuate in future disasters. Responses to this question, as shown in Table 2.25, indicate that three fourths of the interviewees felt that orders to evacuate should be issued in the future. Only 10 per cent said they should not be ordered to leave their homes. Another 14 per cent had some alternative suggestion for handling evacuation and would not commit themselves on the question of whether or not people should be ordered to evacuate. This 14 per cent consisted primarily of people who believed that very strong advice should be used as an inducement to evacuation.

Table 2.25. Percentage of Persons Ordered or Advised to Evacuate During Carla Who Answered "Yes," "No," and "Other" to the Question: "If the Situation Comes up Again, Do You Think People Should be Ordered to Evacuate by Some Public Official?"

	Total	Baytown	Calhoun County	Cameron Parish	Chambers County	Galveston
Yes	75	76	80	89	81	58
No	10	9	7	8	12	13
Other	14	15	13	3	7	29
Total	100	100	100	100	100	100
Number	529	34	77	176	64	178

Caution must be exercised in interpreting these findings, since only persons who evacuated, and who said they were ordered or

advised to do so, were asked this question. It is possible that these are the very people who would most favor an order to evacuate, in contrast to those who remained at home and said they were neither ordered nor advised to leave. In all likelihood, these figures underestimate the proportion of persons opposed to an evacuation order.

Some interesting area differences can be observed in these figures. Galveston, an area well known for its "ride-it-out" customs with respect to hurricanes, yielded the smallest proportion of respondents in favor of ordered evacuation (58 per cent). Cameron Parish, the area with the most recent hurricane experience, and the only one which evacuated under orders, contained the highest proportion of persons favoring ordered evacuation.

It is impossible to state arbitrarily what constitutes a substantial amount of disagreement over whether officials should order evacuation or not. Certainly the above figures show that the majority believed that such officials have this right under severe conditions such as prevailed during Hurricane Carla. However, the 10 per cent who believed they do not have this authority may make up a very vocal and volatile minority which, if they believed evacuation was ordered arbitrarily and without authority, could give elected officials considerable trouble.

The respondents who answered the question on ordered evacuation favorably were also asked who should be responsible for giving the order. These responses are summarized in Table 2.26. The majority (69 per cent) said that civil defense officials should issue the order. The next largest proportion (15 per cent) said a law officer such as the sheriff or city or state police should order evacuation. Eight per cent said city or county officials, and the same proportion named the Weather Bureau. Only one per cent believed that either the state or federal government should have such responsibility. On the basis of these figures, it is clear that an overwhelming majority of the people questioned believed it to be a local responsibility to order evacuation, when and if such an order is called for, and that the majority thought civil defense to be the agency under which evacuation should be ordered.

Selected Hypotheses from the Disaster Literature Concerning Warning and the Response to Warning

In his book entitled The Social Impact of Bomb Destruction, Iklé (1958, p. 12) maintains that people are most likely to evacuate in response to a warning if a catastrophic event is already part of their experience:

Table 2.26. Percentage of Persons Who Said People Should be Ordered to Evacuate through or by Various Agencies

Agency That Should Give Order	Baytown	Calhoun	Cameron	Chambers	Galveston	Total Per Cent
	Percent of Respondents					
Civil Defense	73	73	65	62	75	69
Law Officer	23	10	21	11	10	15
City or County Official	-	11	5	23	3	7
State or Federal Official	-	2	1	4	-	1
Weather Bureau	4	4	8	-	12	8
Total Per Cent	100	100	100	100	100	100
Total Number	26	62	156	52	103	399

> World War II statistics on successive evacuations and return movements disclose that a population reacts more strongly to dangers and deprivations they have experienced or can perceive than to those they have only heard about or have been warned officially to expect, even though the latter may be more disastrous. As a result, people behave in totally different ways before and after they have experienced bombing destruction, or before and after they have experienced an evacuation.

Wallace (1956) makes the same point in his monograph on the Worster Tornado, as does the Instituut voor Sociaal Onderzoek (1955) in the treatment of the Holland floods.

A partial test of this hypothesis is possible through use of the data concerning Hurricane Carla. Respondents were asked whether they thought the full force of the storm would strike their area. They were also asked whether they had ever been through a disaster before, and, if so, what kind. If the above hypothesis is valid, a greater proportion of persons who had experienced disasters would believe the warnings and think that the full force of the storm would strike their area than would those who had no previous disaster experience. Table 2.27 delineates the responses of subjects to these questions.

The data in Table 2.27 indicate that previous disaster experience did not seem to affect respondents' opinions of whether or not the storm would strike their area. However, only 26 per cent of the respondents did not believe that the storm would strike their area. Of those with previous hurricane experience, 28 per cent said they did not think it would hit them—exactly the same percentage as that for victims of other types of disasters. This proportion is only slightly higher than the proportion who had not experienced any disaster, and who thought the storm would not strike their area. In addition to the fact that it is too small to be significant, this difference runs counter to that predicted in the hypothesis.

The ultimate test of how seriously a warning is taken is whether or not people act on the basis of it. These data provide information on whether people evacuated or not, and on whether or not they had experienced a disaster prior to Hurricane Carla. Since all but one respondent received some warning prior to evacuation, warning did play a role in some way or another in everyone's evacuation behavior. Evacuation behavior during Hurricane Carla compared to previous disaster experience is presented in Table 2.28.

Table 2.27. Opinion of Whether the Storm Would Strike Classified by Previous Disaster Experience

Did you think storm would strike your area?	Previous Disaster Experience: None %	Hurricane %	Other %	Total %
Yes	50	46	50	49
Thought it might	24	27	22	26
No	26	27	28	25
Total Per Cent	100	100	100	100
Total Number	572	834	111	1,517

X^2 = 3.35, (4 df) not significant at .05 level

Table 2.28. Evacuation Behavior in Carla Compared to Previous Disaster Experience*

Evacuation Behavior	Previous Disaster Experience: None %	Hurricane %	Other %	Total %
Left community	35	48	53	43
Left home, stayed in community	27	18	19	22
Stayed home	38	34	28	35
Total Per Cent	100	100	100	100
Total Number	570	736	85	1,391

X^2 = 24.2, 4 df. Significant at .001 level.

*There were 125 cases of people who went through more than one disaster, one of which may have been a hurricane. Since the hurricane victims could not be singled out these 125 cases are excluded from this table.

This table yields a significant Chi Square (24.2, 4 df), indicating that previous disaster experience is associated with evacuation. Examination of the figures reveals that persons with previous disaster experience evacuated in a higher percentage of cases than those without such experience. It is interesting to note, however, that those with specific hurricane experience did not evacuate as frequently as did those with other types of disaster experiences.

Mack and Baker, drawing on the Instituut voor Sociaal Onderzoek's work, made the prediction: "People who have survived earlier disasters repeat what was rewarding behavior in previous situations." Thus, when a warning is sounded, they will act in a manner which they have previously found to be effective. This study contained a question asked only of persons who had been through previous disasters. These individuals were asked if they had evacuated during the previous disaster experience. If the Mack-Baker hypothesis is valid, the persons who evacuated in previous disasters should have evacuated in response to Hurricane Carla more frequently than those who had not. A total of 908 respondents with previous disaster experience gave answers to this question. The results are provided in Table 2.29.

Table 2.29. Previous Evacuation Classified by Evacuation Behavior in Hurricane Carla

Evacuation Behavior in Carla	Previous Evacuation Behavior: Evacuated %	Didn't Evacuate %	Total %
Left community	51	45	46
Left home, stayed in community	29	16	20
Stayed home	20	39	34
Total Per Cent	100	100	100
Total Number	256	652	908

$X^2 = 34.85$, (2 df) significant at .001 level

This table indicates that the Mack-Baker hypothesis is probably correct since, in this case, a significant Chi Square was obtained and since a greater proportion of previous evacuees than previous non-evacuees evacuated during Hurricane Carla.

Returning to the original discussion of the Iklé hypothesis, some evidence of its validity is offered by Tables 2.28 and 2.29, both of which show previous disaster experiences to be associated with a higher evacuation rate. However, it is problematic whether the warning received through mass media produced the evacuation results. It is certain that in some cases people evacuated only after high winds and water provided direct evidence of impending danger. Nevertheless, there is no reason to reject the hypothesis that warnings are taken more seriously when a person has had disaster experience than when he has not. Rather, the evidence points in the opposite direction.

If Cameron Parish is compared with its matched sample from Chambers County (as in Table 2.14), more weight is added to this hypothesis. Cameron Parish was the study area with the most recent disaster experience. It also ranks highest in evacuation rate and in other measures of attention to warnings (Tables 2.1 and 2.9).

A whole series of hypotheses concerning the characteristics of people who will take warnings most seriously has been gathered by Mack and Baker. These hypotheses, along with their original source and the data of the present study which relate to them, are presented below.

Sex: Women are more likely to interpret the signal as valid and indicative of an impending disaster than are men (Mack-Baker, 1961, p. 49). Table 2.30 contains the opinions expressed by respondents as to whether they thought the storm would strike their area, based on the reports and warnings they had received. It was found that 51 per cent of the women and 44 per cent of the men were positive in this feeling. An additional 30 per cent of the men and 24 per cent of the women thought the storm might strike.

Table 2.30. Opinion of Whether Storm Would Strike Area Classified by Sex of Respondent

Sex of Respondent	Would Storm Strike Area: Yes %	Thought it Might %	No %	Total %
Male	44	30	26	100
Female	51	24	25	100
Total	49	26	25	100
Number	742	388	387	1,517

$X^2 = 7.6$ (2 df) significant at .05 level

Almost exactly the same proportion of men (26 per cent) and women (25 per cent) said that they did not think the storm would strike them. The significant Chi Square obtained from this table was produced primarily by the difference between men and women in "yes" and "might" responses. If "yeses" and "mights" are combined--since both indicate at least a degree of belief that the storm would strike--there is no difference between the sexes in their beliefs about danger justifying the warning.

Age: Generally, the older the individual the less likely is he to interpret as valid a signal intended to preface a disastrous occurrence (Mack-Baker, 1961, p. 51). Table 2.31 shows the ages of respondents classified on the basis of opinions of whether or not the storm would strike their area. There is remarkably little difference between age groups in the proportion of people holding each opinion. Indeed, the difference is so slight that the Chi Square for this table fails to reach the .05 level of significance. Consequently, on the basis of these data the hypothesis regarding age must be rejected.

Table 2.31. Opinion of Whether Storm Would Strike Classified by Age of Respondent

Age of Respondent	Would Storm Strike Area: Yes %	Thought it Might %	No %	Total %
21-40	49	26	25	100
41-60	49	25	26	100
61-80	48	25	27	100
Number	727	381	385	1,493

$X^2 = 8.6$ (4 df) not significant at .05 level

Race and Ethnic Origin: There is very little difference between races in the interpretation of a signal portending danger. . . . The slight tendency for Negroes to express less often an emotional response to the signal portending danger probably . . . is attributable to the general relationship between formal education and race (Mack-Baker, 1961, p. 50). Respondents were classified during the course of this study into crude racial and ethnic categories. Since Texas and Louisiana were involved in the study, it seemed desirable to differentiate not only between white and Negro, but between Spanish-speaking and other groups in Texas, and French-speaking and other groups in Louisiana. The French and the Spanish categories are fairly accurate. However, another breakdown, between Anglo-Saxon and non-Anglo-Saxon, is not as reliable. For what they are worth, these data are presented in Table 2.32, classified according to opinions of danger.

There was a significant difference between ethnic groups in their opinion of danger. Negroes constituted a significantly lower proportion of those believing the storm would strike their area than any other group. Spanish-speaking respondents were higher in the

Table 2.32. Opinion of Whether Storm Would Strike the Area Classified by Ethnic Origin of Respondents

Ethnic Origin of Respondent	Would Storm Strike Area: Yes %	Thought it Might %	No %	Total %
Negro	41	19	40	100
Spanish-speaking	65	14	21	100
Anglo-Saxon	48	27	25	100
French	50	47	3	100
Other	45	37	18	100
Number	696	370	372	1,438

$X^2 = 47.53$ (10 df) significant at .001 level

proportion expressing the positive "yes" opinion, but lower in expressing the "might" opinion. The French, all of whom were from Cameron Parish and had recently experienced Hurricane Audrey, ranked highest in the total positive opinions. Only three per cent said that the storm was not expected to strike them.

As suggested in the Mack-Baker statement of the hypothesis, there are a number of factors other than ethnic origin which enter into the formation of these opinions. The proportion of Spanish respondents was highest in Calhoun County, the area of maximum impact of the storm. The proportion of French was highest in Cameron Parish, where evacuation was most complete and the memory of Hurricane Audrey was still vivid. The proportion of Negroes was highest in Galveston. In addition to the area factor, the educational and economic differences between ethnic groups are pertinent. These differences are examined in the following pages.

Economic Status: The higher the rank of an individual within a given social category, the more likely he is to interpret as invalid a signal intended to preface a disastrous situation (Mack-Baker, 1961, p. 49). If total reported family income is taken as a measure of social-economic rank, then the data contained in Table 2.33 are related to the above hypothesis.

According to these data, as judged by use of Chi Square, there is no significant difference between income groups in their perception of danger. If any tendency is revealed by Table 2.33, it is that the

Table 2.33. Opinion of Whether the Storm Would Strike Area Classified by Total Family Income

Total Family Income	Would Storm Strike Area: Yes %	Thought it Might %	No %	Total %
$0 - $4,500	51	22	27	100
$4,500 - $7,500	50	28	22	100
$7,500 - Above	45	28	27	100
Total	49	26	25	100
Number	695	368	360	1,423

$X^2 = 8.6$, (4 df) not significant at .05 level

middle income group shows somewhat less tendency to hold a negative opinion about impending danger in response to warnings than do the others. Only 22 per cent of this group said they did not think the storm would strike them as compared to 27 per cent for the lower group, and 27 per cent for the higher group. However, even when the "yes" and "might" opinions are combined, the difference remains not significant.

Economic status was, however, associated with source of first warning. Table 2.34 shows that a significant Chi Square was obtained when economic status was cross-classified with the source of first warning. It is interesting to note that the upper income group received their first warning over television more frequently than did the other groups. There is a slight tendency for greater use of radio by those with lower incomes. This is probably due to differences between income groups in the proportionate numbers of television owners and users.

Table 2.34. Source of First Warning Classified by Family Income

Total Family Income	Source of First Warning: Television %	Radio %	Other %	Total %
$0 - $4,500	54	36	10	100
$4,500 - $7,500	53	34	13	100
$7,500 - Above	62	27	11	100
Number	800	465	165	1,430

$X^2 = 11.01$ (4 df) significant at the .05 level.

Education

Table 2.35 represents data concerning opinions of whether the storm would strike, classified by sex and education. It is apparent that there is very little difference of opinion in this matter between the educational groups for either sex. Two separate Chi Squares were computed using these data, one for each sex. Neither proved significant at the .05 level. For men the Chi Square was 1.96, and for women 2.36, both with four degrees of freedom.

Table 2.35 Opinion of Whether Storm Would Strike Classified by Sex and Education

Opinion of Whether Storm Would Strike	Grammar School	High School	College	Total	
Men	%	%	%	%	No.
Yes	49	50	47	49	742
Thought it might	25	26	28	26	388
No	26	24	25	25	387
Total Per Cent	100	100	100	100	
Total Number	593	603	321		1517
Women					
Yes	51	48	48	49	742
Thought it might	25	25	28	26	388
No	24	27	24	25	387
Total Per Cent	100	100	100	100	
Total Number	457	738	322		1517

Summary of Findings

The extended period of threat prior to the impact of Hurricane Carla afforded ample time to spread the warning of the impending danger. Over nine tenths of the people questioned during this survey received their first warning two days prior to impact. For almost everyone, the warning was first received over the radio or television. After receiving the warning, different groups and categories of people reacted in various ways to it. This survey seems to show that rural residents paid closer attention to warnings, and were induced to act

upon them more frequently than city dwellers. Women seem to have been more affected by warning than men, and the upper income and educational groups more than the middle or lower groups. Ethnic origin also seems to have been associated with reaction to warning.

When specific advice or orders were issued concerning evacuation, a larger proportion of people evacuated than where such knowledge was lacking. Where there was knowledge of an evacuation plan, evacuation was also more likely to have taken place.

Although 10 per cent of the respondents disagreed, some three fourths of them believed that if a situation similar to Hurricane Carla should again arise, people should be ordered to evacuate. The majority of those holding this opinion felt that civil defense should be the agency responsible for issuing the evacuation order.

In this chapter, only those phases of the warning process which took place prior to impact and evacuation are discussed. Therefore, reinforcement and recall, which are phases of the warning process occurring after impact and evacuation, are not included. These latter warning phases are discussed in Chapter Four, which deals with the shelter and return period of the disaster.

CHAPTER III

TO STAY OR TO FLEE: DECISION-MAKING PROCESSES IN EVACUATION BEHAVIOR

As Hurricane Carla approached the Gulf Coast, thousands of families found themselves in a situation in which they were forced to decide whether they would remain in their homes or seek safety in flight. Their decisions were generally made with full knowledge that their lives might well depend on what was done.

Comments from informants indicate that several factors entered into these decisions. But not all these factors were measurable. Two of them, contradictory in nature, were mentioned most frequently: physical safety of the family, and protection of family property. On the one hand, pride in the ability to "take it," the recognition of organizational and occupational responsibilities, and the temptation to witness nature at her most destructive—all served as inducements to remain. On the other hand, the evacuation of friends and neighbors, the urgent warnings that Carla was a "large and dangerous" storm, the insistence, or orders, of public officials that residents evacuate, the fear of damage that might sever such vital supply lines as those for electric power and pure drinking water, and the certainty of discomfort, if not of acute danger—all these considerations indicated that flight would be a more judicious alternative.

The relative strength or weakness of these opposing alternatives—to stay or to flee—varied from family to family and from community to community, in accordance with traditions and with the amount of physical danger that was perceived. Since the response to the hurricane was so variable, it would be specious to ask, "What was the general reaction to Carla?" Calhoun County, over which the hurricane directly passed, was 85 per cent evacuated. Cameron Parish, which was almost totally inundated by the flood, was 96 per cent evacuated. Galveston and Chambers Counties, which were both extensively and severely threatened, were evacuated by 68 per cent and 66 per cent, respectively. Baytown, the least threatened, was only 40 per cent evacuated.

One generalization is permissible on the basis of the data at hand: the people did not panic. The evacuation was calm and orderly. On September 9, 1961, the Houston Post described the Carla evacuation in the following manner:

Photo from Frank Taylor, Galveston

Street along top of Seawall at Galveston in early stages of clean-up.

> About 200,000 persons jammed roads north from the Texas and Louisiana coasts Saturday night as Hurricane Carla set off what was called the greatest planned evacuation in the nation's history. . . . While it was a trail of tears for some, there appeared to be little terror. Despite monumental traffic jams, the evacuation generally was described as orderly.

Disaster research has repeatedly demonstrated that people do not generally panic in their response to dire threats. This is now accepted as axiomatic among those studying the phenomena of disaster. An example is furnished by the study of behavior in threatened areas during the war. After short periods of adjustment, people generally performed their normal duties with considerable calm and deliberateness (U. S. Strategic Bombing Survey, 1946-7. Studies in Holland Flood Disaster, 1953. Institut voor Onderzoek van het Nederlandse Volk, 1955). These observations are certainly of great importance to a nation concerned with the problems of defense from nuclear attack or invasion.

In this problem area of evacuation, a series of interrelated hypotheses were developed. Important concepts concerning decision-making were tested through the use of these hypotheses. The discussion follows the order of appearance of these hypotheses in the research design.

Hypothesis 1:

Evacuation decisions are arrived at by families.

Tabulation of responses indicates that 85 per cent of the members of the families interviewed were wholly or pretty well agreed on what the family should do. Less than two per cent had arguments regarding evacuation, while over 70 per cent reported that they reached their decisions easily. Furthermore, less than 30 per cent reported that evacuation was discussed outside the immediate or extended family, and most of these respondents lived in areas which were heavily evacuated. These three facts, taken together, strongly support the hypothesis that decisions are arrived at by families.

Hypothesis 2:

Families move as units and remain together, even at the cost of over-riding dissenting opinions.

Of the families evacuating, more than 85 per cent left as units. Of those who left in a group of cars, 99 per cent remained together en route to their destinations. While no data were compiled to confirm it, the assumption that the majority of those families that left as units remained together en route is hardly controvertible.

A table which provides a cross-tabulation of the number that left as units with the extent of their agreement on a course of action, indicates that they agreed in 90 per cent of the cases (Table 3.1). This percentage not only exceeds the percentage of families that did not leave as units; it is also higher than that computed for the sample as a whole.

Table 3.1. Family Agreement by Family Action of Evacuees

	Degree of Family Agreement		
Family Action	Much %	Little %	Total Number
Left as a unit	90	10	821
Did not leave as a unit	77	23	83

($X^2 = 10.26$; $P < .001$)

Hypothesis 3:

Groups of families will form spontaneously in public shelters and remain intact even though it means declining the offered comforts of private homes.

During the progress of Hurricane Carla, evacuees were interviewed in Austin shelters by the Disaster Study staff of The University of Texas. While they were not asked at that time about their reaction to leaving the shelter, it was noted by the interviewers that some evacuees actually did refuse to go to private homes, preferring to remain in the public shelter. These observations support the contention that people who became part of a friendly group in the public shelter would prefer to remain there.

In the later, comprehensive study of Hurricane Carla, this contention was stated in the form of a hypothesis and subsequently tested. The data indicate that 87 per cent of the evacuees who remained in

public shelters became part of a friendly group. However, Table 3.2 indicates that those who became part of a friendly group, accepted an offer to stay in private homes almost as frequently as they declined it. The hypothesis, therefore, was not supported by the data from the interviews. However, another intensive study of the shelters, shelter operators, and hosts of evacuees was conducted by a member of the Disaster Study staff. This study was made in Austin and in communities near Austin. Several findings of the study bear directly on the problem under consideration.

Table 3.2. Reaction to an Invitation to a Private Home

	Member of a Shelter Group		
Invitation to Home	Yes %	No %	Total Number
Yes, went	83	17	12
Yes, stayed in shelter	100	0	11

Once people were settled in shelters, they hesitated to leave because of forbidding weather conditions. Local people who invited evacuees into their homes usually preferred families with children, because it enabled them to assist a larger number of people, without involving more than one family. Families with children generally declined these invitations because they were afraid that their children would "mess up the homes." Potential hosts usually emerged from the shelter with evacuated families with no children.

The conclusion from the small number of cases that were studied is that membership in a shelter group was not a significant deterrent to the acceptance of an offer of private lodging by evacuated families. Rather, the presence of children in the evacuated family functioned as a basis for accepting or rejecting these offers.

Hypothesis 4:

Arguments for and against evacuation are most clearly developed in geographic areas where opinion on the matter is most evenly divided.

These data indicate that residents of Baytown had the most evenly divided opinions about evacuation. In that area, only 42 per cent of the people interviewed were completely agreed on what course of action should be followed. In the other sites, the corresponding

percentages were: Galveston, 47 per cent; Chambers County, 59 per cent; Calhoun County, 58 per cent; and Cameron Parish, 66 per cent. Furthermore, the appropriate action agreed upon in Baytown was more frequently in conflict with the official recommendation than was that of people in the other areas. This is demonstrated by the percentages in the other areas of consensus which diverged from official recommendation: Baytown, 23 per cent; Cameron Parish, 5 per cent; Chambers County, 7 per cent; Calhoun County, 10 per cent; and Galveston, 20 per cent. When the two findings are cross-tabulated (Table 3.3), a direct relationship is obtained between the extent of neighborhood agreement and the extent of agreement with official recommendations.

Table 3.3. Neighborhood Agreement by Agreement with Official Recommendations, In Percentages

Neighborhood Agreement	Agreement with Officials		Total Number
	Agreement	Conflict	
Complete	90	11	716
Most	77	23	316
Split 50-50	36	64	138

$X^2 = 200.8$; $P < .001$

Further evidence of this relationship is provided by a cross-tabulation of the degree of neighborhood agreement with the extent of neighborhood evacuation. Table 3.4 indicates that, whether or not neighborhoods were predominantly evacuated, neighborhood agreement was likely to be high.

Table 3.4. Neighborhood Evacuation by the Amount of Neighborhood Agreement

Extent of Neighborhood Evacuation	Neighborhood Agreement		
	Complete %	High %	Split 50-50 %
Above 3/4 and Below 1/4	83	81	69
1/4 to 3/4	17	19	31
Total Number	749	356	151

($X^2 = 16.2$; $P < .01$)

Hypothesis 5:

Role conflict tends to abate after the decision to evacuate has been made and acted upon.

Some 25 per cent of the people interviewed stated that they were concerned about their organizational responsibilities before they evacuated. The data indicate, however, that only 18 per cent of those who eventually did leave were concerned about their organizational responsibilities. Since evacuees constituted only part of the total sample, a test of this hypothesis, on the basis of the findings just cited, would not be valid. (Calhoun County, with 85 per cent evacuation, and Cameron Parish, where the evacuation rate was over 90 per cent, are exceptions to this pattern).

If the factor of evacuation is held constant, however, the changing perception of role conflict is apparent. Then the relationship described in Hypothesis 5 held true for these data. Table 3.5 indicates that there was a definite decrease in concern for organizational responsibilities during evacuation. Of those who were concerned about their organizational responsibilities before they left, 50 per cent ceased to be concerned after they evacuated. At the same time, of those who were not concerned before they left, 11 per cent became concerned after they evacuated.

Table 3.5. Concern for Organizational Responsibilities Before Evacuation by Concern after Evacuation, In Percentages

Concern After Evacuation	Concern Before Evacuation	
	Concerned	Not Concerned
Concerned	50	11
Not concerned	50	89
Total Number	222	672

(X^2 = 185; P<.001)

Hypothesis 6:

Role conflict will begin to increase as plans are made for returning to the danger area.

A cursory glance at the tables seems to indicate that this hypothesis was not supported by the data collected. Eighteen per cent of the evacuees were concerned about organizational responsibilities while evacuated. Immediately before returning, this percentage was

reduced to thirteen. However, since these interviews were conducted nine months after the hurricane, some lapse of memory in this matter is to be expected. Furthermore, 703 people who answered the question, "After you left, were you worried about work or an organization responsibility that might need your attention at home?"—did not answer the subsequent question, "When you were ready to go back home, how concerned were you with these responsibilities?" The respondents who did not answer the latter question very likely considered it redundant. If those in the "No answers" category are eliminated, these data yield entirely different results. Table 3.6 indicates that of those concerned about their organizational responsibilities after they left, four per cent ceased to be concerned by the time they were ready to return home. At the same time, of those who were not concerned after they evacuated, 24 per cent became concerned by the time they were ready to return home. Thus a considerable increase in the perception of role conflict is recorded, which supports this hypothesis.

Table 3.6. Presence or Absence of Organizational Concern right after Evacuation by the Presence or Absence of Concern just before Returning

Concern Before Returning	Concern After Evacuation	
	Concerned %	Not Concerned %
Concerned	96	24
Not concerned	4	76
Total Number	102	98

($X^2 = 104.7$; $P < .001$)

Hypothesis 7:

> Role conflict is intense for such persons as physicians, governmental officials, and welfare workers, who are forced to weigh their personal safety against the demands of their occupation; and these persons will be found to be more active in seeking support from their peers for the decisions made than will the general population of disaster areas.

The study of role conflict was focused on all persons who held a job (paid or voluntary) which was essential to community operation during a disaster period. Thus all medical personnel were included, as well as all clergymen, most governmental officials, all disaster

organization personnel, all law officers, and all utility and communication personnel. By virtue of the occupational positions of these people, it was chiefly within their province to ensure the survival of the community during the extended disaster period. In effect, these people constitute a nucleus of disaster-force personnel.

The initial problems were phrased as follows. How did the behavior of those who thought of themselves as having organizational responsibilities, and who were concerned about these responsibilities, compare with that of those who were not concerned about their organizational responsibilities, as well as with those who did not see themselves as having any organizational responsibility? It was found that those who were concerned about their organizational responsibilities were least likely to leave town, those who were not concerned about such matters more likely, and those with no responsibilities most likely to leave town.

Table 3.7. Evacuation Behavior by Attitudes toward Organizational Responsibilities and by Sample Area

Sample Area and Evacuation Behavior	Concern Over Organizational Responsibility		
	Concerned %	Not Concerned %	No Responsibility %
Baytown			
Left community	17	21	19
Stayed in community*	83	79	81
Total Number	106	156	223
Calhoun County			
Left community	82	93	90
Stayed in community*	18	7	10
Total Number	61	59	70
Cameron Parish			
Left community	91	97	100
Stayed in community*	9	3	0
Total Number	101	104	1
Chambers County			
Left community	30	31	46
Stayed in community*	70	69	54
Total Number	40	51	97
Galveston			
Left community	28	33	40
Stayed in community*	72	67	60
Total Number	74	172	75

*Includes those who stayed home

These results are not the same as those obtained by considering the individuals whose jobs (paid or voluntary) seemed to involve role conflict as it is defined in this study. This is true even when the factor of "organizational concern" is controlled. Indeed, such persons were more likely to leave town if they experienced role conflict. Of those who experienced role conflict, 43 per cent left the community, as compared to 36 per cent of those who had no role conflict (Table 3.8). While the Chi Square for this table is not large, it points to a relationship in the opposite direction of that predicted by the hypothesis.

Table 3.8. Evacuation Behavior by Presence and Absence of Role Conflict

	Role Conflict	
Evacuation Behavior	Conflict %	No Conflict %
Left community	43	36
Stayed in community*	57	64
Total Number	103	1,221

($X^2 = 2.1$; $P < .40$)
*Includes the stay-in-homes

A further refinement of the data indicates that, among those persons in situations likely to induce role conflict, awareness of organizational responsibility and concern for that responsibility made no difference in the ultimate decision about evacuation. In the first place, it was noted that only 23 per cent said that they had no organizational responsibility. Secondly, among those who had organizational responsibility, it was observed that those who were concerned about it evacuated as readily as those who were not concerned, or who thought they had no responsibility (Table 3.9). It is also true and must be mentioned that in many cases persons in the statuses we have named as having inherent role conflict in disaster situations may have evacuated in discharge of their responsibilities; the physician who accompanies evacuated patients from a hospital is an obvious, if infrequently observed, example.

The time interval between the disaster and the interviewing is again of paramount importance in testing this hypothesis. It is probable that some of those who evacuated had justified their action in the

Table 3.9. Evacuation by Organizational Concern for Those Who Had Role Conflict

	Organizational Concern	
	Concerned	Not Concerned
Evacuation Behavior	%	%
Left community	40	40
Stayed in community	60	60
Total Number	43	58

intervening months by convincing themselves that they really had no responsibilities which demanded that they remain in the community. Similarly, those who did remain may have felt compelled to justify their decision by expressing a keen sense of organizational responsibilities. Thus, these data do not provide for an adequate test of this hypothesis.

The net result of the data thus far considered under this hypothesis is that people were, on the whole, more likely to remain in the community if they felt they had an obligation to stay. Many persons who occupied positions with responsibilities did not remain because they did not perceive these responsibilities. This inference is relevant to the policy formation of the civil defense organization. If a community is to keep a disaster-force nucleus on hand, the members of this force must be organized in such a way that their responsibilities are clearly delineated.

Did those persons who had organizational responsibilities seek the approval of their peers more frequently than others? These data indicate that they did. They reported having discussed evacuation more frequently within the family as well as more frequently outside the family. Of those persons in positions considered likely to engender role conflict, almost exactly half (49.5 per cent) discussed evacuation with persons outside the family. This is in contrast to those whose positions were considered unlikely to induce role conflict, who sought outside advice in 40 per cent of the cases. Discussion within the family displays a similar pattern. "Much" family discussion was reported by 62.4 per cent of those considered subject to role conflict, but by only 56.7 per cent of the cases in the opposite category.

Table 3.9. Evacuation by Organizational Concern for Those Who Had Role Conflict

	Organizational Concern	
Evacuation Behavior	Concerned %	Not Concerned %
Left community	40	40
Stayed in community	60	60
Total Number	43	58

intervening months by convincing themselves that they really had no responsibilities which demanded that they remain in the community. Similarly, those who did remain may have felt compelled to justify their decision by expressing a keen sense of organizational responsibilities. Thus, these data do not provide for an adequate test of this hypothesis.

The net result of the data thus far considered under this hypothesis is that people were, on the whole, more likely to remain in the community if they felt they had an obligation to stay. Many persons who occupied positions with responsibilities did not remain because they did not perceive these responsibilities. This inference is relevant to the policy formation of the civil defense organization. If a community is to keep a disaster-force nucleus on hand, the members of this force must be organized in such a way that their responsibilities are clearly delineated.

Did those persons who had organizational responsibilities seek the approval of their peers more frequently than others? These data indicate that they did. They reported having discussed evacuation more frequently within the family as well as more frequently outside the family. Of those persons in positions considered likely to engender role conflict, almost exactly half (49.5 per cent) discussed evacuation with persons outside the family. This is in contrast to those whose positions were considered unlikely to induce role conflict, who sought outside advice in 40 per cent of the cases. Discussion within the family displays a similar pattern. "Much" family discussion was reported by 62.4 per cent of those considered subject to role conflict, but by only 56.7 per cent of the cases in the opposite category.

Table 3.10. Percentage of Respondents Reporting Various Factors as Most Important in Their Decision to Evacuate in Each Sample Area

Most Important Factor	Baytown	Calhoun	Cameron	Chambers	Galveston	Total
Informal Warning	11	8	3	8	15	9
Formal Warning	2	1	6	3	3	3
Threat	87	91	91	89	82	88
Total Per Cent	100	100	100	100	100	100
Total Number	186	173	198	132	267	956

Table 3.11. Percentage of Respondents Reporting Various Factors as Second Most Important in Their Decision to Evacuate in Each Sample Area

Second Most Important Factor	Baytown	Calhoun	Cameron	Chambers	Galveston	Total
Informal Warning	15	8	10	5	9	10
Formal Warning	0	8	11	8	3	6
Threat	79	78	78	83	79	79
No Answer	6	6	1	4	9	5
Total Per Cent	100	100	100	100	100	100
Total Number	176	167	197	127	244	911

When the responses to these two questions were cross-tabulated, the threat of the storm emerged as an overwhelmingly more frequent answer than personal influence. Threat of the storm was the first or second choice of 98 per cent of the respondents. (The overlapping between first and second choices was due to the fact that more than one answer was possible for each category.) "Informal pressures" was chosen as the first or second most important factor by 18 per cent of the respondents. "Formal pressures" was chosen first or second by nine per cent of the respondents (Table 3.12).

Table 3.12. Most Important Factor in Evacuation Decision by the Second Most Important Factor, in Percentages

Second Most Important Factor	Most Important Factor			
	Informal	Formal	Threat	Total
Informal Warning	11	8	10	10
Formal Warning	4	4	6	6
Awareness of Threat	85	88	84	84
Total Per Cent	100	100	100	100
Total Number	83	25	802	910

If attitudinal and informational correlates of leaving the community are ranked on the basis of these findings, personal influence is found very far down on the list. An analysis was made on the basis of the number of respondents who left the community. When a rank correlation was computed between those who left the community and those who evacuated within the community, on the basis of these same correlates, a correlation of .96 (rho) was obtained. The data are arrayed in Table 3.13 in percentages for the research sites and for the total.

Hypothesis 9:

Those who evacuated discussed the danger with others more than did non-evacuees.

This hypothesis was tested by cross-tabulating evacuation with the degree of discussion within the family and discussion outside the family.

Table 3.14 indicates that 66 per cent of the interviewees who evacuated discussed evacuation a great deal in their families, while 50 per cent of those who stayed at home did so.

Table 3.13. Factors Used in Arriving at Decisions, in Percentages

	Sites					
	Baytown	Calhoun	Cameron	Chambers	Galveston	Totals
Had enough information to decide	96	96	99	96	96	97
Followed storm carefully	86	91	98	93	91	93
Most reliable source was radio and T-V	93	83	91	96	81	88
Had no doubts about my decision	80	90	90	86	86	88
Heard news by radio and T-V	90	85	89	90	85	88
Most people I talked to agreed on what to do	71	90	93	85	72	84
Half or more of neighbors evacuated	50	98	99	80	65	83
Thought full force of hurricane might hit	80	65	90	79	79	79
People's advice agreed with official recommendations	46	75	90	77	59	73
Discussed what to do much among family	63	63	72	75	59	67
Family might be in serious danger	59	51	85	63	61	65
Ordered or advised to leave	11	36	81	33	31	45
Discussed outside family	51	50	29	56	41	43
People should be ordered	6	32	77	29	30	41
Would have evacuated anyway	4	30	76	30	28	40
Knew of local plan of evacuation	15	28	61	25	46	39
Knew of other places to evacuate	7	25	69	22	70	35

Table 3. 14. Degree of Discussion by Evacuation Behavior in Percentages

Evacuation Behavior	Degree of Discussion		
	Much	Some	Total Number
Left home	66	34	965
Stayed home	50	50	524

($X^2 = 38.09$; $P < .001$)

Table 3. 14 indicates that the pattern described above varied according to whether or not the informants were ordered or advised to evacuate and according to the degree of danger from the hurricane. Those who were not ordered or advised to evacuate were more likely to have discussed it "much" before they left home. Of those in this category, 60 per cent reported they had discussed the matter "much." Of those who stayed home, and who had not been ordered or advised to leave, "much" discussion was reported by 48 per cent. The differences between these two categories of persons not ordered or advised to leave, and the similar categories of those who were urged to evacuate, are great enough to be highly significant. Among those who were urged to leave home, approximately the same percentages left and stayed: 82 per cent left, and 83 per cent stayed. The conclusion, then, is that both being urged to evacuate and eventual evacuation are accompanied by increased discussion.

However, these figures show a high degree of correlation between the amount of discussion and the action taken only among those who were not ordered or advised to evacuate. Among those who did receive such orders, there seems to be no significant relationship between the amount of discussion and ultimate evacuation behavior. The percentage of those who left home after being urged to do so is, as may be expected, much higher than is that of those who were not subjected to such suggestion; in fact, it is so high that it accounts in large part for the lack of meaningful correlation between their action and the amount of discussion about what they should do (Table 3. 15).

A direct relationship is observed between evacuation and discussion outside the family. That is: 40 per cent of those who stayed at home discussed the situation outside the family; 47 per cent of those who evacuated to the community discussed the situation outside the family; 50 per cent of those who left the community discussed the situation outside the family. However, when "orders or advice" to evacuate are controlled, the relationship of the variables changes.

Table 3. 16 indicates that evacuees were more likely to discuss evacuation outside the family only when there was an unstructured

Table 3.15. Evacuation Behavior by Degree of Discussion and by Presence or Absence of Evacuation Orders or Advice

Evacuation Behavior	Advised or Ordered to Evacuate				Not Advised or Ordered to Evacuate			
	Much Discussion %	Some Discussion %	Total %	No.	Much Discussion %	Some Discussion %	Total %	No.
Left home	82	18	100	317	60	40	100	510
Stayed home	83	17	100	41	48	52	100	470

Table 3.16. Evacuation by Discussion outside Family and Advice to Evacuate

Evacuation	Ordered or Advised*		Totals		Not Ordered or Advised**		Totals	
	Family %	Outside %	%	No.	Family %	Outside %	%	No.
Left community	60	40	100	282	40	60	100	288
Stayed in community	48	52	100	106	59	41	100	194
Stayed in home	55	45	100	49	60	40	100	434

*$X^2 = 4.42$; $P < .11$
**$X^2 = 30.63$; $P < .001$

situation. When there were no orders or advice to evacuate, those who left the community were much more likely to discuss the situation outside the family. When such orders or advice were given, those who stayed in the community were more likely to discuss the situation outside the family.

Another cross-classification may be made for these data: the extent of neighborhood evacuation by discussion outside the family. Table 3.17 indicates that interviewees who lived in neighborhoods that were more than half evacuated were more likely to have discussed evacuation outside the family. This positive relationship, between extent of neighborhood evacuation and discussion outside the family, again draws attention to the search for support among friends and neighbors in the decision-making process, as well as, perhaps, a period of collective excitement directly related to the degree of recognition of grave common danger.

The net result of these findings seems to be that official advice and discussion serve as alternative means toward reaching a decision, to a degree. If official advice was forthcoming, it tended to be accepted; if it was not available, the threatened person used discussion as an aid to decision-making.

Table 3.17. Extent of Neighborhood Evacuation and Discussion outside Family

Discussion	More Than 3/4 %	1/2-3/4 %	1/4-1/2 %	Less Than 1/4 %
In family	47	46	55	64
Outside family	53	54	45	36
Total Per Cent	100	100	100	100
Total Number	727	184	89	360

Hypothesis 10:

A "snow-ball" effect will result from increased discussion and observation of the evacuation of friends, relatives and neighbors and produce a strong inducement to conforming behavior. This, in turn, will result in ecological patterns which roughly correspond to "natural areas," each with a significantly different distribution of evacuation behavior. These ecological patterns will be evident, even though the population of the area as a whole was given the same formal warning and was subject to the same danger from the hurricane.

Data presented in Tables 3.16 and 3.17 tend to support this hypothesis. Certain additional inferences can be made. For instance, Table 3.18 demonstrates the existence of a direct relationship between extent of neighborhood evacuation and discussion outside the family; i.e., discussion outside the family increased with increasing neighborhood evacuation.

Table 3.18. Extent of Neighborhood Evacuation in Relation to Discussion in and outside the Family, in Percentages

	Extent of Neighborhood Evacuation		
Discussion	Above 3/4	1/4-3/4	Under 1/4
In family	47.2	49.1	64.4
Outside family	52.8	50.9	35.6
Total Number	727	273	360

What was the relationship of evacuation of persons and families to the extent of the neighborhood evacuation? Did those interviewed show the same pattern that was apparent in the neighborhood in which they lived? It is established in Table 3.19 that 86 per cent of those living in neighborhoods where more than three fourths evacuated, also evacuated; evacuees constituted 59 per cent of those living in neighborhoods where one fourth to three fourths evacuated; 31 per cent of those living in neighborhoods in which less than one fourth left were among those who evacuated. Thus, these informants showed approximately the same pattern of evacuation behavior as was found in the neighborhoods in which they lived. This fact strengthens the importance of the earlier finding that a direct relationship prevailed between extent of evacuation and discussion outside the family. Thus, it can be said that the hypothesis is supported. It is assumed that the terms "neighborhood" and "natural area" are synonomous, and that they meet the criteria of the second portion of the hypothesis.

Obviously, these two variables are not independent. A respondent drawn randomly from a high evacuation area is more likely to be an evacuee than a non-evacuee. Because of this, the Chi-Square of 310.4 obtained from the above table does not tell us what the effects actually are of seeing other people evacuate.

For this reason, the effects of the "conformity" factor cannot be tested through these data. It is probably true that some people evacuated because they saw other people doing so, but this cannot be

verified by the above figures. The only clue available in our data on this point is that nine per cent of all respondents said that the main reason they evacuated was that friends or relatives were evacuating. This matter is discussed at greater length in the following chapter.

Table 3.19. Family Evacuation by Extent of Neighborhood Evacuation, In Percentages

	Extent of Neighborhood Evacuation		
Evacuation	Over 3/4 %	1/4-3/4 %	Under 1/4 %
Left home	86	59	31
Stayed in home	14	41	69
Total Number	762	292	388

Hypothesis 11:

Females will be more ready to evacuate than males.

Every table constructed, when the factor of sex is controlled, indicates that the women were more inclined to evacuate than were the men. This is true whether the family eventually left or stayed home. Tables 3.20 and 3.21 demonstrate the existence of this relationship between sex and desire to evacuate.

Not only do these tables lend support to the hypothesis that wives were more concerned than husbands about the dangers of remaining in their homes; they also present some evidence that the ultimate family decisions were in accord with their desires more frequently than with those of their husbands. However, this conclusion is tentative since it is based on only fragmentary knowledge of the dynamics of decision-making in the interviewees' families. But the evidence here is very similar to that developed by a comparison of replies to questions designed to get at fear in the warning discussion.

The question might be raised as to who answered these questions, since more women than men were interviewed. That is, did the high proportion of women respondents unduly influence the data on the matter of attitude toward leaving? This possibility was examined in some detail. It was found that though there were no significant differences between the way the male respondents answered these questions and the way female respondents answered them, there was a slight and consistent tendency for the women respondents to indicate

Table 3.20. Evacuation and Attitude toward Evacuation by Sex, in Percentages

Evacuation	Male			Female		
	Wanted to leave	Wanted to stay	Total Number	Wanted to leave	Wanted to stay	Total Number
Leave community	74	26	592	83	17	630
Stayed in community	58	42	255	70.4	29.6	301
Stayed in home	12	88	470	17.7	82.3	491

Table 3.21. Evacuation and Attitude toward Evacuation by Family Members, in Percentages

Family Roles	Wanted Most to Leave			Wanted Most to Stay		
	Left Community	Stayed in Community	Stayed Home	Left Community	Stayed in Community	Stayed Home
Husband	27	22	8	26	32	40
Wife	43	43	15	12	18	18
Child or other	11	16	7	6	9	2
All	8	5	1	4	3	24
None	11	15	69	52	38	16
Total Per Cent	100	101	100	100	100	100
Total Number	636	324	503	625	300	491

that both men and women were more anxious to stay than the men indicated. This discrepancy in reporting attitude toward evacuation ran approximately three per cent in every site except Galveston, where it ran 11 per cent. Table 3.22 contains the total figures.

Table 3.22. Attitudes toward Evacuation by Respondents' Sex, in Percentages

Attitude	Respondents' Sex	
	Male	Female
Male*		
Stay	55	58
Leave	45	42
Total Number	325	799
Female**		
Stay	43	48
Leave	57	52
Total Number	306	970

*X^2 = .7 N.S.
**X^2 = 2.24 P<.30 (two tail)

At this point of the investigation, a form of serendipity occurred. It was noticed that regardless of what variables were controlled, women were more anxious and more likely to evacuate than men. The only exception to this generalization was found when the personal adjustment factor was controlled simultaneously with the age factor (for each area studied). Among those who rated themselves below average in emotional and personal adjustment, the men were often as likely to want to evacuate as the women. There was no distinct pattern for each sex. However, the numbers in these categories were so small that any conclusions based on them would be unreliable.

The matter of emotional adjustment itself seemed to warrant further investigation. There were three questions designed to probe this matter. The first question was, "Do you feel that you worry more, or less, than most people about decisions you make?" The second was, "In terms of emotional and personal adjustment, how do you consider yourself in relation to others?" The third was, "After a decision is made, most people think some about what would have happened if they had made a different decision about the problem. How do you feel you compare with others?"

It was found that the attitude toward evacuating varied in direct relationship with each of these three questions. That is, the more respondents worried, the more maladjusted they felt they were, or the more indecisive they were the more likely they were to want to evacuate. The over-all emotionality index (all three items totaled) probably provides a more valid measure than any one of them taken separately. In relating this index to attitude toward evacuation, it is apparent that in all cases people with a low emotionality index were more likely to want to stay than people with a higher emotionality score (Table 3.23).

Table 3.23. Emotionality Index by Attitude Toward Evacuation, in Percentages

Attitudes	Emotionality Index Scores		
	Low: 0-3	Medium: 4-6	High: 7-9
Wanted to Stay	52	39	24
Wanted to Leave	48	61	76
Total Number	731	552	70

Since the interviewing was conducted some months after the hurricane, the question may be raised as to whether the emotionality index measures a pre-existing condition that led to evacuation, or reflects emotionality growing out of the hurricane experience nine months before. Since the query dealt with evacuation, the first would be the logical assumption.

It was also found that the attitudes toward evacuation varied directly with the danger to the area involved. When this factor was controlled, the pattern described above still prevailed. Furthermore, a direct relationship was observed between emotionality scores and the degree of threat. That is, the greater the threat to a site the more likely were the respondents from that site to score high on the emotionality index. The same result was achieved by averaging the total scores on the emotionality index. The average scores were: Baytown, 3.34; Chambers County, 3.36; Galveston, 3.64; Calhoun County, 3.97; and Cameron Parish, 5.30.

Table 3.24. Emotionality Scores by Sites, in Percentages

Sites	Emotionality Scores		
	Low: 0-3	Medium: 4-6	High: 7-9
Baytown	61.8	35.8	2.3
Calhoun County	52.8	39.9	7.3
Cameron Parish	34.2	54.5	11.4
Chambers County	59.6	38.3	2.1
Galveston	54.5	40.9	4.6

Hypothesis 12:

Families with children will be more ready to evacuate than childless families.

According to the figures in Table 3.25, families with children were more anxious to evacuate than families without children. As the number of children increased, the percentage who wanted to stay at home decreased. The changes in percentages are regular and are all in the same direction.

Table 3.25. Attitudes toward Evacuation by Number of Children, in Percentages

Number of Children	Attitude Toward Evacuation		Total Number
	Wanted to Stay	Wanted to Leave	
None	54	46	787
One	48	52	590
Two or three	45	55	933
Four or more	36	64	418

$X^2 = 36.7$; $P < .001$

Further, Table 3.26 indicates that families with children were also more likely to have left their home towns than were families without children. Thus, in both attitude and evacuation behavior, families with children were more eager to find safety in flight--an eagerness which increased with the number of children involved.

Table 3.26. Evacuation by Number of Children, in Percentages

Number of Children	Evacuation Behavior: Left Community	Evacuation Behavior: Stayed in Community	Total Number
None	34	66	475
One	45	55	315
Two or three	44	56	491
Four or more	57	43	255

Hypothesis 13:

Older people will be less prone to evacuate than younger people.

Tables 3.27 and 3.28 indicate that this hypothesis was supported. There is a clear, direct relationship between these two variables.

Table 3.27. Evacuation Behavior by Age of Head of Household, in Percentages

Evacuation	Age: 21-40	Age: 41-60	Age: 61 and over
Left community	48	43	37
Stayed in community	21	21	22
Stayed in home	31	37	41
Total Per Cent	100	100	100
Total Number	519	715	277

It is a safe assumption that the evacuation of older persons will pose distinct problems. Many of these persons are not physically able to travel long distances without serious discomfort. Many of them have dietetic and medical requirements which render such travel precarious or even impossible. Older people are less able to take care of themselves and to adjust to strange surroundings. Awareness of these factors must have been high with the elders and with those in charge of evacuation. Hence, it is not surprising that the percentage of persons staying through the storm in their own homes increases with age.

A research finding more pertinent in regard to this hypothesis is that the expressed desires of the elderly coincide with their actions—they seem to have stayed home because they did not want to leave. It is very probable that a large amount of rationalization entered into the replies to this question. However, it is clearly evident that emergencies do not create a clamor on the part of the older portion of the population for protection from danger.

Table 3.28. Age of Adults in Households by Attitudes toward Evacuation, in Percentages

Attitude	Age 21-40	41-60	61 and over
Wanted to Stay	42	48	56
Wanted to Leave	58	52	44
Total Number	1,144	1,216	918

Hypothesis 14:

Upper and middle socio-economic groups will be more likely to evacuate than the lower group.

This hypothesis was not supported by the data. Income, occupation, and education were cross-tabulated with evacuation. Two of these variables indicated that the lowest socio-economic group was most likely to evacuate, or was as likely to leave the community as the highest group (Table 3.29).

Table 3.29. Evacuation by Income, In Percentages

Income	Evacuation Behavior: Left Community	Stayed in Community	Stayed Home	Totals %	Totals No.
Under 2,500	39	33	28	100	262
2,500-4,500	43	32	25	100	276
4,500-7,500	49	19	32	100	468
Over 7,500	38	12	50	100	454

$\chi^2 = 95.69$; $P < .001$

When data on evacuation and staying in the home are broken down along income lines, certain interesting and unexpected results appear. Those in the middle income brackets--$2,500 to $7,500 yearly income—were more likely to leave their communities than those earning either less than $2,500 or more than $7,500. The highest and lowest income categories were almost exactly alike in their tendency to evacuate the community.

However, when attention is shifted to those who evacuated their homes, but not their home towns, the picture is changed. Those with incomes of less than $4,500 were much more likely not to remain in their homes than those with higher incomes. There is a clearly discernible tendency toward a direct relationship between income and the probability of having remained in the home. The most important statistic in this table clearly is that revealing that the highest income bracket was much more likely to remain in their homes than those in either of the other categories.

Explanations for these differences are easily provided. Those in the middle income range would have automobiles and available money, and thus could leave town more easily than those in the lowest bracket. But they would not have as strongly built homes in which they would feel as secure as would those in the highest income range. The majority of those who left their homes and remained in their towns went to public shelters; the remainder took refuge in the homes of friends or in hotels and motels. Public shelters were occupied in the main by persons with low incomes; persons on the next higher level would be expected to have friends and relatives in a better position to house them with safety. Those in the upper income ranges, however, with better housing, and perhaps less sense of freedom to move in with other families, were more likely either to remain at home or to leave the community. Those on the lowest economic level live in houses of poor construction situated at lower elevations. Thus they would be more exposed to physical danger. At the same time, they would tend to lack funds and automobiles to carry them to safety elsewhere. Hence these individuals would be less likely to remain in their homes, but more likely to remain in their home towns, i.e., to go to public shelters for safety.

These data demonstrate once more the maxim that disaster strikes hardest at those least able to absorb its blows.

Since occupation and income are practically interchangeable indices of status and behavior, it is to be expected that Table 3.30 will display a pattern quite similar to that of Table 3.29. It does. The conclusions from the first table are very similar to those from

Table 3.30. Evacuation by Occupation of Head of Household, in Percentages

Occupation	Evacuation Behavior: Left Community	Stayed in Community	Stayed in Home	Totals %	Totals No.
Professional-managerial	48	14	38	100	317
Farm owners-managers	71	11	18	100	82
Clerical-sales workers	39	12	49	100	67
Craftsmen-operatives	42	19	39	100	472
Service workers	35	39	26	100	139
Laborers	41	32	27	100	164

$\chi^2 = 83.26$; $P < .001$

the second. However, certain differences appear. The farm owners and managers were predominantly located in areas which were flooded. Hence the regard for self-preservation made it imperative that they evacuate. Like the professional and white-collar workers, these occupational groups showed a tendency either to stay in their homes or to leave their communities.

The statistics show that a much larger percentage of clerical-sales workers stayed in their homes than was true of craftsmen-operatives. This finding seems to imply the operation of a prestige factor in evacuation behavior. It may be speculated that clerical-sales workers felt that their recourse to public shelters would in some way constitute a stigma. Their blue-collar cousins, on the other hand, accepted this profferred aid with less reluctance. At any rate, further studies could profitably explore the implications of the fact that the white-collar workers remained in their homes more often than did those of any other occupational class--including the professionals.

The temptation is strong to reduce those who evacuated their homes but remained in the community into two categories: the laborers and service workers in one, and all others in the second. If this is done, the resultant figures clearly indicate a lower mobility of the lower income families.

An inverse relationship manifestly obtains between the tendency to evacuate and level of educational attainment. The more education,

the more likely the family was to remain in its own home; the less education, the more likely the family was to leave the community and/or to leave their home but stay in their community (Table 3.31).

Table 3.31. Evacuation by Education,* in Percentages

Education	Evacuation Behavior: Left Community	Stayed in Community	Stayed in Home	Totals: %	No.
8th grade or less	49	26	25	100	841
9th-12th grade	44	21	35	100	1,338
Some college	38	15	47	100	640

*Includes both respondent and spouse.

Since education is very closely associated with occupation and income, the data in Table 3.31 reinforce the general conclusions drawn from an examination of the latter two factors. The pattern is most clearly displayed, however, by the data on education. This may mean that training in analysis of information—the more purely intellectual element—is more important than either amount of earnings or occupational status, in making a decision in the face of grave and recognized danger.

Statistical support for this premise is supplied by a cross-tabulation of education and emotionality scores. The progressions are all in the expected direction and in fairly regular steps. It is interesting to note that the break in the accompanying table comes between the categories of "low" and "medium" emotionality, rather than between the "medium" and "high" scores, as might have been expected logically.

Table 3.32. Education by Emotionality Index

Education	Low %	Medium %	High %	Total: %	No.
8th grade or less	43.1	46.4	10.5	100.0	295
9-12 grades	52.7	41.6	5.8	100.0	772
Some college or more	62.3	33.5	4.2	100.0	313
Total	52.8	40.8	6.4	100.0	1,380

$X^2 = 32.38$ $P < .001$

Hypothesis 15:

The distance traveled in evacuation will be associated with socio-economic status.

Two tables were constructed to test this hypothesis. The figures in Table 3.33 establish the existence of a crude association between these two variables. People with higher income were more likely to travel farther than people with lower income. However, visiting with relatives constitutes an intervening factor. Even lower income groups traveled great distances if they were to stay with relatives at the end of the journey. When those who stayed with relatives were withdrawn from the total figures in Table 3.33, the pattern became quite clear, thus supporting the hypothesis.

Of more importance than demonstration of the validity of this hypothesis is the finding that the modal distance traveled from home to refuge was less than 25 miles. In view of the dramatic appearance of refugees in Dallas, Fort Worth, Longview—some more than 300 miles from their homes—it is surprising to discover that these constituted only a minor fraction of the evacuees, most of whom merely "stepped around the corner." This finding takes on even greater significance when it is recalled that Chambers and Calhoun Counties and Cameron Parish were flooded for distances up to a dozen or more miles from the shore line. The implication is clear that the Red Cross, civil defense, the military, and others concerned with the housing of displaced persons must plan in great detail to move and house persons over a large area, but even clearer that every possible advantage must be taken of shelters near the disaster scene.

Table 3.33. Income by Distance Traveled in Evacuation, in Percentages

Income	Distance Traveled in Miles				Totals	
	0-24	25-99	100-199	Over 200	%	No.
Under $2,500	58	23	15	5	101	151
$2,500-4,500	58	23	9	9	99	151
$4,500-7,500	38	27	22	13	100	233
Over $7,500	32	22	34	13	101	173

Interesting, though perhaps not of great relevancy, is the fact that only those in the higher income bracket were more likely than not to have gone more than 25 miles to seek safety and that these families traveled over 100 miles in their quest (Table 3.34). But when the

staying-with-relatives factor is controlled, this finding no longer holds. Perhaps these data indicate that wealthy persons belong to extended families with members scattered over a wider area; or that wealthier families are more likely to maintain intimate relationships with relatives living at greater distances.

Table 3.34 Percentage of Respondents Not Staying with Relatives, Classified by Income and Distance Travelled in Evacuation

Income	Distance Traveled in Miles				Totals	
	0-24	25-99	100-199	Over 200	%	No.
Under $2,500	65	19	14	3	101	102
$2,500-4,500	73	16	4	7	100	99
$4,500-7,500	56	18	17	9	100	110
Over $7,500	48	14	29	9	100	86

$X^2 = 28.56$; $P < .001$

Hypothesis 16:

The distance traveled will be associated with stage in the family life cycle.

This hypothesis has already been tested in the consideration of Hypotheses 12 and 13. Thus, according to Tables 3.25 and 3.26, families with children were more likely to evacuate. The evidence accumulated through the tabulations provides a firm basis for the conclusion that the older the person, the more likely he was to remain in his home. On the other hand, those married and with children were likely to evacuate. The hypothesis is supported.

All data detailed in this discussion of decision-making by persons and families have been derived from statistical treatment of the schedules utilized in interviews in the five sites studied. All respondents were sought out and interviewed in their capacities as householders and family members. They may be said to constitute the consumers of the planning and administration of plans by officials of political and privately supported institutions at levels ranging from purely local to national—from the office of the President of the United States to that of a school principal at Double Bayou or of a Red Cross representative in Seadrift.

Of the sixteen hypotheses related to decision-making by persons and families formulated and tested, an even dozen were clearly

indicated as being correct as formulated. Four others were demonstrated to be invalid as stated. An examination of these four hypothesis is in order, in an attempt to determine why the expectations were not borne out by the facts.

Hypothesis 3 stated that groups of families would form spontaneously in shelters and would remain intact, even though this meant that their members would decline invitations to move to private homes.

The first portion of this hypothesis was clearly demonstrated to be valid. Many such groups did form, as confirmed by informal interview materials in addition to the more formalized data from the schedules. However, the second portion of the hypothesis did not find support in either source. A total of 23 families reported that they had been invited into homes. Significantly, all but two of these were members of shelter groups. Ten of these group-member families accepted the invitation and left their group. Eleven group members declined the invitations. The two families who were not members of groups accepted invitations to private homes. In terms of group membership, the division between those who remained in the shelter with their groups and those who accepted the opportunity to move into private homes could not have been more even. Thus, this portion of the hypothesis fails of support.

Hypothesis 7, which held in essence that those in critical positions would be less likely to evacuate, presents a confused picture. The data bearing on this hypothesis were classified in three ways: in terms of the amount of concern felt by persons for their responsibilities; in terms of their employment in an occupation of critical importance in an emergency; and a combination of these two.

In terms of felt concern, without reference to the nature of the position, the hypothesis is supported; those most concerned evacuated in the lowest proportion. But if the factor of felt concern is controlled and only the position held is studied, it is found that those in positions which are here defined as belonging to a disaster-force nucleus were more likely to leave. Finally, if both factors are studied simultaneously, i.e., if felt concern is also taken into consideration, no discernible difference is found in the probability of such persons' staying or leaving. The conclusion must be drawn, if reluctantly, that those on whom community welfare depends do not give evidence of their acceptance of that responsibility by remaining in their endangered communities. It must be pointed out that in some cases persons in critical statuses would best serve their community by leaving it—the National Guard officer called to emergency duty, or the telephone worker who is called to repair distant breaks in the system which serves his town—are examples which come readily to mind. This

would seem to suggest that a need exists for a program of action to induce such persons to accept the onus of their positions. However, the problem of sponsorship for such an effort is awkward, since those who would normally be expected to take the initiative in such action are precisely those toward whom the action would be directed.

The key to data bearing on this hypothesis appears to lie in the attitudes of the persons concerned. However, the lapse of time between action based on attitudes and the recollection and reporting of those attitudes subjects the validity of any finding to doubt.

Hypothesis 8 is rejected, insofar as these data have bearing on it. The evidence is overwhelming that persons and families do not base their actions on the advice of personal and trusted friends in an emergency such as Hurricane Carla, but act directly on the basis of information from the mass media. This has important implications for current communication theory, as developed by Katz and Lazarsfeld in Personal Influence (1955) for example. Perhaps an event such as a hurricane is sufficiently direct in its threat and clear in its issues that persons in hurricane country feel little need to resort to primary group sources for information. The simple fact would seem to be that the nearly omnipresent broadcast communication has supplanted the word-of-mouth communication chain in such situations. What the results would have been in other circumstances, or if the relative acceptance of information from the two general sources had been ascertained, is a matter for speculation until further research has been conducted.

Hypothesis 14, viewed in retrospect, appears to have been too broadly drawn; the differences found appear to be greater between the middle class and the upper and lower extremes than between the two extremes. Certainly there is no smooth continuum ranging from lower to upper, measured in terms of income or occupational status. There is some evidence, but certainly not conclusive, that non-economic factors may be operative.

The over-all conclusion from these data is that the people who reported their experience evacuated or stayed home as members of family and other groups—not as individuals. They left as family units, they remained in family or other groups while away, and they returned as families. Further, occupational status appears to have exerted influence on the decisions made, though it was surprising to discover an apparent lack of determination on the part of professionals to remain in the danger areas in order to keep their services available if needed. Economic status was found to be less important than originally thought. A finding of relevancy to administration research is that when authorities

gave clear clues as to behavior, the discussion lessened or disappeared, and action of one type or another was taken. However, the arrival at a resolution of problems centering about evacuation behavior is a complex process. Clearly this study has not exhausted the possibilities for profitable study in this matter of making decisions under threat of a natural disaster. More incisive data, more incisively analyzed, is certainly needed.

CHAPTER IV

SHELTER AND RETURN PERIOD

Introduction

The half-million refugees from Hurricane Carla sought refuge in various shelter areas and shelter types. Some remained in their own communities, but took advantage of the shelters established there. Others traveled hundreds of miles from their homes seeking a place of safety and found it in public shelters, hotels, motels, or private homes.

Red Cross estimated that Hurricane Carla displaced 206, 103 persons who registered for some period of time in one or more of 540 shelters staffed by approximately 20, 000 professional and volunteer workers from churches, labor unions, civic clubs, corporations, social welfare agencies, police and fire departments, rescue squads, and a host of other interest groups.

This chapter is concerned with what happened to the evacuees during the time they were away from home. A number of questions arise in this connection. For example, how far did evacuees travel to find shelter? What problems did they encounter on their way? In what type of shelter did they eventually find themselves? How long did they remain there? What problems did they face in the shelter? What attitudes toward evacuation did they form on the basis of their experiences? Answers to these questions are provided in the following pages.

Distance Traveled by Evacuees

The distance traveled by evacuees is dependent upon their area of residence. In rural areas close to the coast, where no large city was within a short distance, evacuation was effected over long distances. Table 4. 1 contains the various distances traveled by the evacuees from each of the sample areas.

In Calhoun County, which was in the eye of the storm and was relatively isolated from large cities, proportionately more people traveled long distances than did those in the other sample areas.

Houston Chronicle Photo
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A volunteer fireman finds sleep easily when opportunity comes.

Table 4.1. Distance Traveled by Evacuees by Sample Area, in Percentages

Sample Area	Miles Traveled in Evacuating					Total	
	No Answer	0-24	25-99	100-199	200 Plus	%	Number
Baytown	2	51	13	20	13	100	187
Calhoun County	2	4	43	45	5	100	175
Cameron Parish	2	17	67	10	0	100	198
Chambers County	1	51	24	17	8	100	145
Galveston	3	59	20	4	14	100	267
Total	2	38	33	18	8	100	972

Almost half the Calhoun County refugees went more than 100 miles before reaching shelter. In Baytown, which had the lowest evacuation rate, refugees were divided into two groups in terms of distance traveled. Half went less than 25 miles from home (this is the distance to Houston). However, 34 per cent exceeded 100 miles in distance traveled. In Cameron Parish, virtually all the refugees went to Lake Charles. This means that 72 per cent went less than 100 miles from their homes. Galveston and Chambers Counties were likewise characterized by movement of less than 100 miles. In Galveston, 79 per cent traveled less than 100 miles, and in Chambers County, 75 per cent went this distance, or less, from their homes.

The distance traveled is associated with the type of shelter sought by evacuees. Table 4.2 shows the per cent of evacuees in each sample area, classified in terms of each type of evacuation behavior.

Galveston had the highest proportion (38 per cent) of people who evacuated their homes for shelter within the community itself. This is in contrast to Calhoun County, where only four per cent remained in shelters in the community, and to Cameron Parish, where only three per cent did so.

The types of shelter selected by evacuees are delineated in Table 4.3, which contains the number and percentage of people from each of the five sample areas who stayed in different types of shelters.

Private homes provided shelter for 58 per cent of all evacuees. Another 18 per cent went to commercial lodgings such as hotels or motels. Only 23 per cent stayed in public shelters. Sample areas, however, differed considerably in the relative use of various shelter types.

The largest proportion that took shelter in private homes was found in Cameron Parish, where only six per cent stayed in mass shelters. The smallest proportion staying in private homes was in Galveston.

These data indicate a rural-urban difference in the use of shelter types. As shown by Table 4.4, rural people seemed to be more highly concentrated in private homes than were their city counterparts.

Rural-urban utilization of hotels and motels was virtually equal, although the proportion was slightly higher for urbanites. City refugees, however, were more prone to use public shelters than were rural refugees. This is due to the fact that most public shelters were located in cities, and thus were used predominantly by city dwellers who evacuated their homes but remained in their own communities.

Table 4.2. Type of Evacuation Behavior by Sample Area, in Percentages

Evacuation Behavior	Baytown	Calhoun	Cameron	Chambers	Galveston
No answer	1	1	0	1	2
Stayed home	60	10	3	33	31
Left community	19	85	94	37	29
Went to friend's or relatives' home in community	10	2	2	7	12
Went to public shelter in community	5	0	0	4	9
Went to public building in community	5	2	1	18	17
Total Per Cent	100	100	100	100	100
Total Number	504	200	208	202	401

Table 4.3. Percentages of Evacuees Who Used Various Types of Shelters in Different Areas

Type of Shelter	Baytown %	Calhoun County %	Cameron Parish %	Chambers County %	Galveston %	Total %
Private home	67	58	72	57	44	58
Hotel-Motel	7	24	22	6	26	18
Public shelter	26	18	6	36	30	23
Total	100	100	100	100	100	100
Number	195	186	200	141	275	997

Table 4.4. Rural-Urban Differences in Shelter Type, in Percentages

	Private Home	Hotel-Motel	Public Shelter	Total %	Total No.
Rural*	66	16	18	100	341
Urban**	53	18	28	100	470
Rural and Urban	59	17	24	100	811

*Rural sample consists of Chambers County and Cameron Parish.
**Urban sample consists of Baytown and Galveston.

Private homes bore the brunt of providing shelter to refugees, and most of these (78 per cent) were homes of relatives.

Table 4.5. Arrangements for Refugees to Stay in Private Homes

Arrangements made with	Number	Per Cent
Relatives	446	78.4
Friends	102	17.9
Other	21	3.7
Total	569	100.0

The fact that the majority of refugees from Hurricane Carla stayed in the houses of relatives is of significance in considering the relationship between general migration patterns in the United States and evacuation patterns in disasters. The migration from rural to urban areas has been continuous for some time. Thus, it is apparent that people from rural areas will generally have relatives living in cities. The homes of these relatives, therefore, are potential shelters during a disaster period.

Studies of migration have shown that larger cities tend to draw migrants from greater distances than do small cities. This means that the relatives of migrants to large cities would tend to live further away than migrants to small cities. Consequently, the rural countryside surrounding large cities would tend to have a proportionately smaller number of homes of relatives of city dwellers, and fewer private homes would be regarded as potential shelters by large city dwellers. This point is further developed in the discussion of the application of the Hurricane Carla research findings to nuclear attack situations.

Source of Information About Public Shelters

Evacuees who remained in public shelters were asked how they knew about their existence and location. A substantial proportion (24 per cent) said, "There is always a shelter there." Thus, disaster practices were well known to many victims of Hurricane Carla. As already noted, 48 per cent of the respondents in this study had already experienced at least one hurricane. It was customary in hurricane areas along the Gulf Coast for shelters to be established in certain locations—for example, in high schools. Consequently, knowledge of where a shelter was located was not a problem for many residents. As shown in Table 4.6, however, a sizable proportion of respondents reported finding out about shelters over radio and television, or from civil defense workers, or from a friend or relative. Since only people who stayed in public shelters were asked how they knew about them, no comparative figures are available for non-evacuees or for those who stayed in private homes and hotels or motels.

A special study of shelters in Austin, conducted by David L. Treybig (1962), provides additional insight into the processes involved in the allocation of people to shelters. Since Austin is located a considerable distance from the coast, city officials and the managers of hotels and motels in that city did not anticipate a sizable influx of refugees. On Saturday morning, the 2,600 rooms available in Austin's commercial hotels and motels, which provided space for approximately 5,500 people, were operating at their usual week-end rate of occupancy (between 40 and 60 per cent). As the day wore on, refugees from Hurricane Carla began to arrive or to make reservations for later arrival. By 9:30 p.m., every hotel and motel room in Austin was occupied or had been reserved by evacuees from the Gulf Coast. Guests who would normally have checked out to return to their homes on the coast extended their stay, thus further increasing the occupancy rate.

Table 4.6. How Evacuees Knew about Public Shelter

Source of Information about Shelter	Number	Per Cent
Radio or T. V.	64	28
Civil defense worker	24	10
Shelter always there	56	24
Friend or relative	47	20
Other evacuee (stranger)	3	1
Other	36	16
No answer	2	1
Total	232	100

On Saturday evening, after the facilities of commercial lodgings were exhausted, the Red Cross chapter received information from the police headquarters leading it to believe that an alarming increase in evacuees. over and above those already present, could be expected. Consequently, steps were taken by the Red Cross through its disaster committee to open a shelter in a public school building. The disaster committee asked that the police direct refugees to the school, and crude signs were erected at this point to guide them to it.

In Lake Charles, Louisiana, which was the principal shelter area for residents of Cameron Parish, local officials were prepared for the emergency, as were operators of hotels and motels. The recent experience with Hurricane Audrey, and later with Hurricane Donna, had thoroughly familiarized both the residents of Cameron Parish and their Lake Charles hosts with hurricane evacuation procedure. Shelters were set up in Lake Charles schools and were ready when refugees began to arrive. These shelters were established in the same locations that had been used for Hurricane Audrey evacuees. Motels and hotels in Lake Charles were likewise ready to receive refugees. As was the case in Austin, the hotels and motels filled to overflowing early in the evacuation. Overcrowding of rooms was permitted as "normal hurricane procedure." Rooms were rented for a flat double occupancy rate, and families were allowed to crowd in as many people as suited them. Extra blankets and linen were provided so that people could sleep on the floor.

Many hotels and motels reported that a high percentage of their guests during the hurricane period were persons who frequently stayed with them. They also reported that their guests came from a given neighborhood in Cameron Parish. Observations made by field workers confirmed this.

The Austin and Lake Charles observations, taken together with the interview data obtained from refugees, seem to indicate that there is a definite pattern in choice of shelters. Refugees, as a class, apparently will seek shelter with relatives and friends first, preferring this type of accommodation to all others. Failing in this, they will seek space in a hotel or motel. When these accommodations are filled to capacity, the shelters begin to attract refugees. Of course, important qualifications to this generalization must be made when the factor of social class is considered. This is explored elsewhere in this report. However, the order of preference for evacuation accommodations seems to follow the pattern just described. This is apparent to a degree in Table 4.7, which delineates the answers to the question: "If you were forced to evacuate again, in what kind of accommodations would you prefer to stay?"

Table 4.7. Preferences for Various Shelter Types in Future Evacuation

Shelter Preferred	Number	Per Cent
No answer	46	4.7
Private home	496	51.1
Hotel-motel	192	19.8
Public reception center	158	16.3
Other	78	8.0
Total	970	100.0

Trouble Encountered in Evacuating

One of the most amazing features of the evacuation for Hurricane Carla was the low automobile accident rate. No fatalities resulted from the movement of cars during evacuation. This is due in large measure to the extended period of time during which the evacuation took place. The half-million refugees did not all leave at the same time. Almost 90 per cent of all evacuees left more than 24 hours before the storm reached its height in their particular area. Evacuation actually proceeded over a three-day period. This explains the figures in Table 4.8, which contains the percentage of those encountering various difficulties during the process of evacuation.

As shown in Table 4.8, 85 per cent of the evacuees reported having had no trouble at all, and only six-tenths of 1 per cent reported either having had a traffic accident themselves or having been delayed by one which involved others. The remainder cited "bad road conditions" or "heavy traffic" as an impediment to evacuation.

Table 4.8. Trouble Encountered en Route to Shelter Area

	Number	Per Cent
No answer	33	3.4
No trouble	829	85.3
Heavy traffic	76	7.8
Bad road conditions	23	2.3
Traffic accidents	6	.6
Other	5	.5

Length of Stay

The Hurricane Carla evacuation was an unusually long period as compared with that of other hurricanes. This stemmed from the unusual behavior of Hurricane Carla when she delayed her final inland plunge. Table 4.9 shows that the average evacuee spent 3.7 days away from home. In Cameron Parish, where the most prolonged evacuation took place, the average stay was five days, as compared to Baytown with an average of 2.8 days away from home. The unusually long period away from home observed in Cameron Parish and in Galveston (3.9 days) was the result of the fact that water remained high for several days after impact. Baytown, the only non-coastal area, had the lowest length of stay, due to the absence of a persistent high-water hazard. Had other areas been studied—for example, Freeport, which remained flooded for an extended period after impact—the average length of stay away from home would have exceeded even that for Cameron Parish.

Hypotheses Concerning the Shelter Problem

A number of hypotheses concerning the shelter problem are presented in Chapter One. These are systematically examined below, using the data obtained from interviews.

Hypothesis 3:

People from the same neighborhood or community will tend to select the same shelter or shelter area.

Several questions were asked of respondents to test this hypothesis. First, those who stayed in public shelters were asked whether there were people in the shelter with whom they had been acquainted previous to evacuation. The results of this question are presented in Table 4.10. Seventy per cent of those who stayed in public shelters already knew people who were also there; 30 per cent did not. Assuming there was a 50-50 chance that evacuees would know someone in the shelter from previous experience, this indicates a significant relationship between knowing someone and being in the shelter (X^2 = 3..48, 1 df. $P<.001$).

When asked if they knew in advance whether a friend or relative would be in the shelter, 55 per cent of the respondents said "Yes." This is shown in Table 4.11. Both Tables 4.10 and 4.11 give support to Hypothesis 3. The strongest support, however, comes from the data presented in Table 4.12, in which the reasons given by respondents

Table 4.9. Percentage of Respondents Staying Away from Home Various Lengths of Time in Different Sample Areas

Days Away From Home	Sample Area					
	Baytown	Calhoun County	Cameron Parish	Chambers County	Galveston	Total
No answer	2	7	2	0	10	4
1 day	15	1	2	10	3	5
2 days	29	26	2	30	12	18
3 days	27	34	8	26	23	23
4 days	16	24	15	15	21	18
5 days	4	6	37	6	18	15
6 days	0	1	14	4	6	5
Week or more	7	6	21	10	7	10
Total	100	100	100	100	100	100
Number	187	175	203	145	267	975
Average days	2.8	3.3	5.0	3.2	3.9	3.7

Table 4.10. Percentage of Respondents Giving Indicated Answers to the Question, "Were there people in the public shelter who were known to you?"

	Number	Per Cent
No	66	29.7
Yes, relatives	48	21.6
Yes, neighbors	63	28.4
Yes, friends	29	13.1
Yes, others	16	7.2
Total	222	100.0

Table 4.11. Advance Knowledge That Friends or Relatives Would Be in Public Shelter

Knowledge of Friends or Relatives Presence	Number	Per Cent
Knew friends or relatives would be there	122	55.0
Didn't know friends or relatives would be there	96	43.2
No answer	4	1.8
Total	222	100.0

Table 4.12. Reasons for Choosing Shelter Area

Reasons	Number	Per Cent
No answer	39	4.0
Knew the town	74	7.6
Had friends or relatives there	595	61.2
Everyone said it was the place to go	52	5.3
Other	86	8.8

for choosing a particular shelter area, are listed. Over 61 per cent cited the presence of friends or relatives as their reason for choosing a given area.

Hypothesis 3, a-1:

The type of shelter used will depend upon the availability of friends or relatives.

This hypothesis is supported by the data cited above. In addition, the majority of respondents (66 per cent) stated that they knew someone in the hotel or motel to which they evacuated. These data, lending further support to this hypothesis, are presented in Table 4.13.

Most evacuees stayed in private homes with relatives. This fact, taken together with the data contained in Tables 4.10, 4.11, 4.12, and 4.13, seems to indicate that evacuees are strongly influenced in their choice of shelter area and type of shelter by the presence or absence of relatives, friends, or acquaintances.

Table 4.13. Percentage of Respondents Who Gave Indicated Answers to the Question, "Were there people in the motel or hotel who were known to you?"

	Number	Per Cent
No	60	33.5
Yes, relatives	28	15.6
Yes, neighbors	43	24.0
Yes, friends	29	16.2
Yes, other	19	10.6
Total	179	100.0

Hypothesis 3, a-2:

The type of shelter used depends upon the socio-economic status of the evacuee.

There are a number of means through which socio-economic status may be measured by utilizing the available data. Two of these, reported family income and occupation, have been selected for the purpose of testing this hypothesis. The ensuing discussion explores the relationship of these factors to choice of shelters by evacuees.

1. Income: Income strongly influences the type of shelter sought, as shown in Table 4.14. The higher the income, the less tendency there is to stay in a public shelter, and the greater the tendency is to stay in either a private home or a hotel or motel. The upper income group is more than twice as likely to use the latter type of facility than the lower income group.

Table 4.14. Types of Shelter Classified by Income of Evacuees

Type of Shelter	Income 0-$4500 %	$4500-$7500 %	$7500 + %	Total %	Total No.
Private home	53	64	62	59	535
Hotel-Motel	13	18	27	17	154
Public shelter	37	18	11	24	219
Total	100	100	100	100	971

2. Occupation: Occupation is highly correlated with income, and therefore should also be associated with choice of shelters. Table 4.15 delineates the type of shelter utilized by various occupational groups. Although the number of cases is too small for percentages to be very meaningful, they are included in order that comparisons can be made between the choice of shelters of the various occupational groups.

The data in Table 4.15 further substantiate the relationship between socio-economic status and choice of shelter type. While only 11 per cent of the professional and managerial group stayed in public shelters, 46 per cent of the service group, and 37 per cent of the laboring group used these facilities. Hotel and motel facilities, as might be expected, were used to the proportionately highest extent by the white-collar group, which includes managerial, professional, clerical, and sales workers. However, the laboring group sought shelter in hotels and motels to a much greater extent than was expected, and had a comparatively low rate, along with service workers, of utilization of private homes. This may be a result of the combined factors of large families among refugees in these groups, and small houses on the part of their potential hosts, their relatives and friends. Because of lack of adequate space in private homes, laboring groups and service workers may have been forced to use the facilities of hotels, motels, and public shelters.

Hypothesis 3, b:

People will tend to form cliques or groups within shelters and attempt to perpetuate the interpersonal communications network that existed prior to evacuation.

This hypothesis can be tested using the information about group formation in the shelter area obtained from the interviews, and of data

Table 4.15. Type of Shelter Utilized by Various Occupational Categories

Type of Shelter	Professional Managerial %	Farm %	Clerical Sales %	Operators Craftsman %	Service %	Laborer %	Retired %
Private home	63	65	61	63	40	41	55
Motel-Motel	26	17	28	15	13	22	12
Public shelter	11	18	11	22	47	37	33
Total Per Cent	100	100	100	100	100	100	100
Total Number	179	77	36	298	80	119	73

(X^2 = 74.02, 12 df, P<.001)

on communication with others during evacuation. Respondents who stayed in hotels and motels or in public shelters were asked whether they became members of a "friendly social group" while they were in the shelter, and also about the relationships of the members of that group to one another. Table 4.16 contains the answers to the first of these questions.

Table 4.16. Group Formation in Hotels-Motels and in Public Shelters

	Hotels, Motels		Public Shelter	
	No.	%	No.	%
Became part of group	131	73.2	204	87.9
Did not join group	41	22.9	22	9.5
No answer	7	3.9	6	2.6
Total	179	100.0	232	100.0

Of those staying in public shelters, 88 per cent said they became part of a "friendly social group" as compared to 73 per cent of the motel-hotel customers. Thus it appears that mass shelters tend to foster group formation more than do hotels and motels. Public shelters afford less privacy and bring people together in mass feeding and sleeping quarters. For this reason, they probably promote the formation of groups which cross over family lines.

The evacuees were asked who belonged to the shelter clique. The answers to this question indicate that such cliques were composed primarily of persons who knew one another before evacuation. This is shown in Table 4.17. Only 21 per cent of the motel-hotel refugees and 15 per cent of the evacuees in public shelters reported that such friendly groups contained people who met for the first time during evacuation. However, 12 per cent of the motel-hotel customers and 25 per cent of those in the public shelters reported that these groups contained a membership which combined new and former acquaintances.

The two types of shelters differ significantly in the composition of cliques which were formed. The greatest difference is found in the category combining former and new acquaintances. Public shelters seem to foster the formation of groups whose members were not acquainted before evacuation. This is probably due to the lack of privacy in public shelters as noted above, in comparison with that offered by hotels and motels.

Table 4.17. Membership of Cliques of Evacuees Formed in Shelters

	Shelter Types		
	Hotel Motel %	Public Shelter %	Total %
People met for first time	21	15	17
People known well back home	58	52	54
People known casually back home	9	8	9
Combination of above	12	25	20
Total Per Cent	100	100	100
Total Number	135	203	338

($X^2 = 10.02$, 3 df, $P < .02$)

These data lend support to Hypothesis 3, b. It appears that groups formed in shelters are built largely around previous contacts. A number of new acquaintanceships are formed; in most cases these seem to be added to—rather than substituted for—relationships that were established before the disaster.

Hypothesis 3, c:

Within the public shelter, rumors will present a major morale problem because of the lack of systematic feedback of information from the evacuated area.

All evacuees, regardless of the type of shelter in which they were found, were asked whether they heard reports they believed at the time but later discovered to have been false. Their responses are contained in Table 4.18.

Table 4.18. Rumors Heard during Evacuation

Heard Rumors or False Reports	No.	Per Cent
No answer	50	5.1
Yes	245	25.2
No	678	69.7

Only 25 per cent of evacuees reported having heard false rumors. This seems to be a relatively small proportion, considering that numerous erroneous reports were actually aired over television and radio. This may mean either that respondents never discovered that such reports were false, or that during the several months intervening between the storm and the interviews they forgot about them.

When asked about the nature of false reports, respondents gave answers which indicated that most of these recalled reports overestimated rather than minimized such effects of the storm as damage, loss of life, and danger (Table 4.19). The majority report of evacuees that rumors tended to exaggerate the effects of the storm is in agreement with observations made about the reports issued over mass media. The more sensational aspects of Hurricane Carla received an inordinate amount of attention. It is probably true that evacuees who in returning to their homes found relatively little damage, regarded these reports as more exaggerated than did those whose property suffered major damage.

Table 4.19. The Nature of False Reports

Nature of Rumor	Number of Different Reports	Per Cent
Over estimation of storm's effect	218	89.0
Under estimation of storm's effect	11	4.5
Other	16	6.5
Total	245	100.0

Respondents were also asked whether reports were disturbing or upsetting to them. About 74 per cent of those reporting rumors said they were upset by what they heard.

These data do not provide sufficient evidence to support the contention that rumors presented a morale problem for evacuees. Further, no measure of morale was found which could be used to test its relationship to rumors.

Some additional questions were asked of respondents which were designed to elicit information by which Hypothesis 3, c might be tested. Observations made by a field team during the course of the storm—in Lake Charles, in which the Cameron Parish evacuees were located, as well as in Austin—indicated that subsequent to impact an information

vacuum developed concerning conditions in the evacuated areas. No one seemed really to know what conditions were along the coast. Evacuees were openly concerned about what was happening, or had happened, back home. It did not seem to the field teams that information about conditions in the impact area was either very specific or very accurate. On-the spot observations in Cameron Parish confirmed the fact that reports circulating about conditions in Lower Cameron were inaccurate, in that they both overestimated and underestimated the effects of the storm.

Table 4.20. While You Were Away, Did You Feel That You Knew Pretty Well What Was Happening in Regard to Carla?

	Number	Per Cent
Yes	699	87.5
No	100	12.5
Total	799*	100.0

*173 of those who stayed in their home communities but not in their homes were inadvertently not asked this question.

In addition to the questions about the circulation of rumors and the nature of false reports, respondents were also asked to judge the reliability and adequacy of general information which they were given while evacuated. Table 4.20 contains the distribution of responses of evacuees to the question, "While you were away, did you feel that you knew pretty well what was happening in regard to Carla?" The vast majority (88 per cent) responded in the affirmative. Further, when asked how reliable they thought the available information was, 95 per cent said it was either entirely reliable or fairly reliable (Table 4.21).

The results of the interviewing on this matter were unexpected, inasmuch as field observations led to the opposite conclusion from that of the majority of respondents. It may be that respondents were either uncritical of news reports and believed what they heard, or that they did not associate what they heard with what they found to be true from personal observations. An additional possibility is that the time lapse between the hurricane and the interviewing was too great to allow for accurate responses to such questions. The fourth alternative, that the news was reliable, is not admissible, in light of the considerable evidence to the contrary from direct field observations.

Table 4.21. As You Look Back on It, How Reliable Do You Think Information about Carla was during the Time You Were Evacuated?

Estimate of Reliability of News	Number	Per Cent
Entirely reliable	479	59.8
Fairly reliable	282	35.2
Not very reliable	33	4.1
Could not depend on it	7	.9
Total	801*	100.0

*171 of those who did not evacuate their home communities but who left their homes were inadvertently not asked this question.

Despite the prevailing opinion that the news of the effects of the storm was reliable, many evacuees made attempts to verify personally the reports about their home areas. More than half (56 per cent) did attempt to verify the news reports, and in the largest number of cases, this was done by talking either to some other evacuee or contacting some other unofficial source of information. Of the 56 per cent who made some attempt at verification of news, less than half—23 per cent—contacted civil defense, the Red Cross, or some other official source of information. Eight per cent actually went back to their home areas in an attempt to determine what conditions were (Table 4.22).

Table 4.22. Did You Attempt to Find Out Personally What Was Going On in Your Home Area while You Were Evacuated?

	Number	Per Cent
Going to civil defense, Red Cross, state police, etc.	75	9.3
Calling some official agency on the phone	111	13.8
Going to talk to people in another shelter	19	2.4
Calling some unofficial source on phone	138	17.2
Going back to your home area	60	7.5
Other	50	6.2
No	350	43.6
Total	803*	100.0

*169 of those staying in their home communities were inadvertently not asked this question.

These findings lead to the statement and testing of the final hypothesis about warning. In reality, this hypothesis contains a theory as to why people leave the shelter before it is safe to do so.

Hypothesis 3, d:

Mass media tend to overplay the dramatic aspects of disaster. This distortion is an important factor in fostering high anxiety and low morale among evacuees. This situation is aggravated by the failure or inability of agencies to relay accurate information from the devastated area. The ill-defined conditions of the "home" area will result in premature attempts at return by evacuees, even in the face of danger from health or accident hazards. This indicates that the task of conducting evacuation is not as great as that of controlling premature return.

Direct observation in the disaster area led to the belief that large numbers of people were making premature return attempts. Respondents were asked whether any members of their families, while evacuated, attempted to return to their home areas before they were notified it was safe to do so (Table 4.23). Almost 26 per cent of all respondents reported that some member(s) of the family made a premature attempt to return. This would mean that, of the total 500,000 evacuees, at least 25,000 made premature attempts to return to their homes.

Study areas differed widely in the proportion of attempts at premature return. In Cameron Parish, where the length of evacuation stay averaged five days, 45 per cent reported premature return attempts, as compared to only five per cent in Calhoun County, where the eye of the storm eventually struck.

On-the-spot observations in Cameron Parish led to the belief that early return attempts were made most often by those people who owned livestock and lived in the open country. Cattlemen seemed particularly persistent in making attempts to return home to look after their animals. The hypothesis that rural evacuees will make more attempts at premature return than urbanites was subsequently tested. The results of this test are presented in Table 4.24.

As was expected, rural and urban areas were found to differ significantly from each other, and in the direction predicted. People from the country made more premature return attempts than did city dwellers.

It was observed in Cameron Parish that evacuees who were kept from returning to their homes by roadblocks set up by civil defense

Table 4.23. While Your Were Staying Away from Home Evacuated Did You or Any Members of Your Family Attempt to Go Back to Your Home?

	Cameron %	Baytown %	Calhoun %	Chambers %	Galveston %	Total %
No answer	1	2	2	1	14	5
Yes	45	26	5	33	21	26
No	54	72	93	66	65	69
Total Per Cent	100	100	100	100	100	100
Total Number	197	187	175	145	266	970

Table 4.24. Early Return Attempts by Evacuees from Rural and Urban Areas

	Type of Area		
Attempts Made	Rural* %	Urban** %	Total %
Yes	40.8	25.4	32.4
No	59.2	74.6	67.6
Total Number	341	413	754

$X^2 = 20.58$, 1 df, $P < .001$

*Cameron Parish and Chambers County combined.

**Galveston and Baytown combined, Calhoun County is excluded.

were extremely angry. An effort was made to determine how many return attempts were turned back by roadblocks, and what the reaction was to this action. Table 4.25 delineates the number and per cent of return attempts which were blocked by civil defense, police, deputy sheriffs, or other official persons, in the sample areas.

As shown in Table 4.25, a significant number of return attempts were thwarted by police roadblocks in Cameron Parish. Cameron also was the only area in which evacuation was ordered and in which a fully developed civil defense organization was utilized throughout evacuation.

Galveston was the only other area reporting a substantial number of blocked return attempts. It will be noted that there is a major discrepancy between the figures for Galveston in Tables 4.23 and 4.25. Only 57 people from the Galveston sample reported making return attempts that were premature. However, 81 reported on whether such attempts were blocked or not. The only possible explanation for the discrepancy seems to be that 24 people made attempts to return which they did not consider premature, but which nevertheless were blocked by police.

It was originally intended that all respondents would be asked whether they thought officials had the right to keep people from returning to their homes. This question was not answered consistently, probably because of its location in the interview schedule. Those responses which were elicited are contained in Table 4.26.

The findings presented in Table 4.26 are twofold. In the first place, the majority of respondents who answered this question thought

Table 4.25. Successful and Unsuccessful Return Attempts Due to Roadblocks, in Percentages

Attempt Blocked	Sample Area					Total
	Baytown	Calhoun	Cameron	Chambers	Galveston	
Yes	10	22	33	13	23	23
No	90	78	67	87	77	77
Total Number	51	9	101	46	81	288

Table 4.26. Do Officials Have the Right to Keep People Out?

Sample Area	Yes %	No %	No Answer %
Baytown	17	8	22
Calhoun County	4	4	25
Cameron Parish	27	54	12
Chambers County	19	19	15
Galveston	33	15	27
Total Per Cent	100	100	100
Total Number	224	112	649

law officers had the right to keep people from returning home. Of the 336 total responses, exactly two thirds were positive and one third negative. In the second place, a substantial (112 out of 336) disagreement existed concerning the right of law officers to set up and maintain roadblocks.

According to observations made by this research team, and according to reports gathered by civil defense officials and reported in their publication Hurricane Carla (1962), violent objections were made to roadblocks throughout the disaster area. In Cameron Parish, where the highest proportion of respondents challenged the right of officers to control re-entry, violent arguments developed between citizens and the police who manned the barricades. So profound was the resentment which developed that, following Hurricane Carla, a number of resignations were made in civil defense. The dispute heightened to such a point that attempts were made to remove the director of civil defense.

Similar political repercussions were felt in Texas counties, but feelings were neither as deep nor as lasting. The case of Galveston, as reported in the official civil defense publication, Hurricane Carla, is interesting in comparison with the Cameron Parish situation.

Breakdown of Roadblocks

> Under successive compromises with expediency, most roadblocks disintegrated within a day or two. Galveston County noted, 'The mayors decided to throw up a roadblock around the county and let no one in—even residents. It was effective, but about the second day we had complaints from residents

> of three cities that were all right . . . we issued an order allowing residents into these three if identified. About 12 hours later mayors of Galveston and Texas City said let residents in, keep sightseers out. It was almost physically impossible.' (Treadwell, 1962)

The problem of controlling re-entry was due to a number of factors. One of the major factors involved was uncontrolled and sometimes irresponsible reporting through the mass media about events and conditions in the impact area, as well as the garbled reporting of official announcements. For some unknown reason, false "all-clears" were sent out over the air from some radio and television stations. In Lake Charles, an official announcement was misread over television and radio to the effect that people could return to the disaster area. Similar mistaken reports were made in Dallas and in Houston.

The anxiety of evacuees was undoubtedly increased by exaggerated reports of damage. In Louisiana, a man was interviewed on the air who reported that the town of Cameron had been destroyed, and stated that Carla was worse than Hurricane Audrey. Reports of looting also circulated widely. It appears that such reports are ubiquitous in disaster situations; and are generally badly exaggerated. This is one of the aspects of disaster situations that needs more exploration than it has received.

The following examples of false information during the evacuation period are taken from the civil defense publication cited above:

Erroneous Radio Announcements

> For reasons unknown to local government, upstate radio stations also began to advise evacuees to return long before the danger was past. Radio and TV announcements, more than any other factor, were credited with starting the stampede that endangered the success of the whole evacuation-reception operation. Complaints from local government were widespread. (Treadwell, 1962, p. 51).

From Texas City:

> The health officer said we might have an epidemic; houses were still flooded with mud and sewage. We decided we would keep people out until we got water

> and sewer systems reestablished and food in. However, Dallas radio made an unauthorized statement that Texas City wanted people back to help with the cleanup. (Treadwell, 1962, p. 51).
>
> From Brazoria County:
>
> We put out a request to news media that Freeport had no water, sewerage, or food, and to tell people to stay away. Dallas didn't get the news somehow and was broadcasting that we wanted them back. They got the Freeport message mixed with another city's. This was the biggest weakness in the whole operation. (Treadwell, 1962, p. 51).

The problem of controlling premature return ranked first among the difficulties faced by state and local officials during the emergency of Hurricane Carla.

Summary. During the evacuation period of the Hurricane Carla disaster four major, closely interrelated problems developed for officials concerned with the public welfare. First, there was the problem of maintaining an accurate surveillance of conditions in the evacuated area. The second problem involved decision-making with respect to the public welfare. On the basis of information assembled about the disaster area, officials had to decide what action should be taken. Should evacuees be prevented from returning, or should they be permitted to go home at will? Should they merely be warned not to return, or should they be forcibly kept out by the use of roadblocks sustained by police power? Third, it was necessary for officials to communicate their decisions to the public and to their own subordinates. Furthermore, they had to decide how, when, and by what means information of various types would be passed on to the public. The fourth problem consisted of the actual exercise of control over the return of evacuees to their home communities.

All these decisions and actions had to be effected in a situation in which the social and psychological conditions prevailing within the evacuated communities were such as to aggravate the problems.

Mass evacuation, during which a major proportion of the population within a community leaves its home area, drastically alters the relationships among people, as well as changing the organization and functioning of the social system. At the same time, certain psychological conditions are created which have profound effects on the behavior of evacuees, especially with reference to duly constituted authority.

In total or near-total evacuation, such as occurred in the case of Cameron Parish during Hurricane Carla, officials and private citizens alike evacuated to a host community leaving behind only a skeleton of the former social system. As a consequence, the evacuated community ceased to function in its home area, and carried on as best it could in the host community where officials and private citizens alike were intermingled with the host population.

As pointed out, evacuation during Hurricane Carla was carried out largely by families as units. In the host community families were distributed in various kinds of shelter facilities. The majority stayed in private homes, and the next largest number in hotels and motels, with the smallest number staying in public shelters. Because of the extensive utilization of private homes and hotel-motel facilities in contrast to public shelters, the evacuees were widely dispersed over the shelter area.

Officials of the evacuated areas set up operation wherever possible in host communities—in most cases in the counterpart offices in that area. For example, Cameron Parish civil defense operated from the Lake Charles civil defense office. Evacuated officials were placed in the position of being guests in a host community; they had no official authority. Access to communication facilities was gained through the cooperation of the host community. Even at the highest level of cooperation, many factors were present in the situation which made it difficult for such individuals to perform their official functions effectively.

For example, unless careful planning had preceded evacuation, officials themselves became dispersed and had difficulty communicating with one another. On some occasions, key persons could not be located or became temporarily "lost" in the confusion. In other cases, some officials remained behind in the disaster area while others left for the host community; thus communication became difficult or impossible. Under the best of conditions, the arrival at joint decisions by the officials of the evacuated area was made most difficult. This became clearly apparent in the later stages of evacuation during Hurricane Carla, when decisions had to be made with respect to the return of people to the disaster area. The conditions discussed below made official action difficult at this time.

Lack of Reconnaissance System

As noted in the chapter on warning, there was a tendency for contact with the devastated area to break down after impact. The Weather Bureau carefully tracked Carla on her course across the

Gulf of Mexico and inland across the United States, reporting the conditions created by the storm. However, once the storm had struck the coast and passed inland, there was no agency responsible for reporting conditions in the disaster area. The Weather Bureau continued to report winds and tides, but no one had the specific task of making a reconnaissance of the disaster area and reporting on conditions that had significance for public safety. This task was performed only in a fragmentary manner.

Officials in each county or city attempted, by any available means, to assemble information about conditions created by Hurricane Carla. In areas where communication facilities were damaged and roads were blocked, it was difficult to ascertain conditions accurately. In areas such as Cameron Parish, where evacuation was nearly complete, reconnaissance teams had to be sent into the area for this purpose.

While officials were engaged in an attempt to construct a picture of conditions in the disaster area, the news media were reporting stories to the public—over radio and television and in newspapers—which had been gathered from every immaginable source. Some stories and bits of information or advice came from official sources, others from on-the-scene observers, and still others from refugees. Accurate and inaccurate reports, absurd exaggerations, and deplorable understatements of conditions were broadcast almost simultaneously. The net effect seems to have been one of extreme confusion.

In evacuation centers such as Lake Charles, Austin, Houston, and Dallas, evacuees underwent a noticeable and understandable change once the eye of the storm had passed over the coast. It was as if the storm were officially over; and it was time to return home. The reason for evacuation had passed; Carla herself was no longer a danger. An additional motivation was the evacuees' desire to find out what had happened to their property, or to the friends and relatives they had left.

Decisions Concerning Return

Officials, on the other hand, had to recognize their public responsibility. They knew that power lines were likely to be down, that water supplies were contaminated, and that various hazards to life and health were likely to be present in the disaster area. On the basis of incomplete information about conditions in the disaster area, they had to decide whether to permit return or prevent evacuees from returning.

Before there was an actual opportunity to warn people about the dangers of premature return, evacuees began to make return attempts.

At various places, roadblocks were erected. Officials generally did not hesitate to use police powers to prevent premature return when they thought conditions warranted it. However, many returning evacuees challenged or evaded the authority of the police in this matter.

The emotionality of returning evacuees seems to have been aggravated by the fact that they had heard contradictory reports concerning conditions in their home areas. Actual fights and near riots took place at some roadblocks because returning evacuees felt these measures represented an infringement upon their rights.

Under such conditions, public officials were under severe pressure from all sides. On the one hand, the public safety demanded caution and patience. The unseen dangers of water pollution and disease and the unpredictable hazards of broken power lines and ruptured gas mains were more real to the public official than to the evacuees. The public exerted pressure to be permitted to return immediately to their home communities.

As might be expected, officials in different areas reacted to these cross-pressures in various ways. In Cameron Parish, where officials had had the most recent experience with post-hurricane hazards, the roadblocks were maintained longest. In Galveston, where only partial evacuation had taken place, the roadblocks were short-lived.

Reinforcement of Evacuation through Continued Warning

Because of the manner in which the mass media operate, official bulletins and announcements are disseminated to the public along with unofficial news and "spot" reports. During the post-impact period in Hurricane Carla, the mass media cooperated with public officials by reading announcements and bulletins immediately upon their reception. Because of the urgency of the situation, however, such official communiques sometimes were garbled, or confused with contradictory reports from unofficial sources.

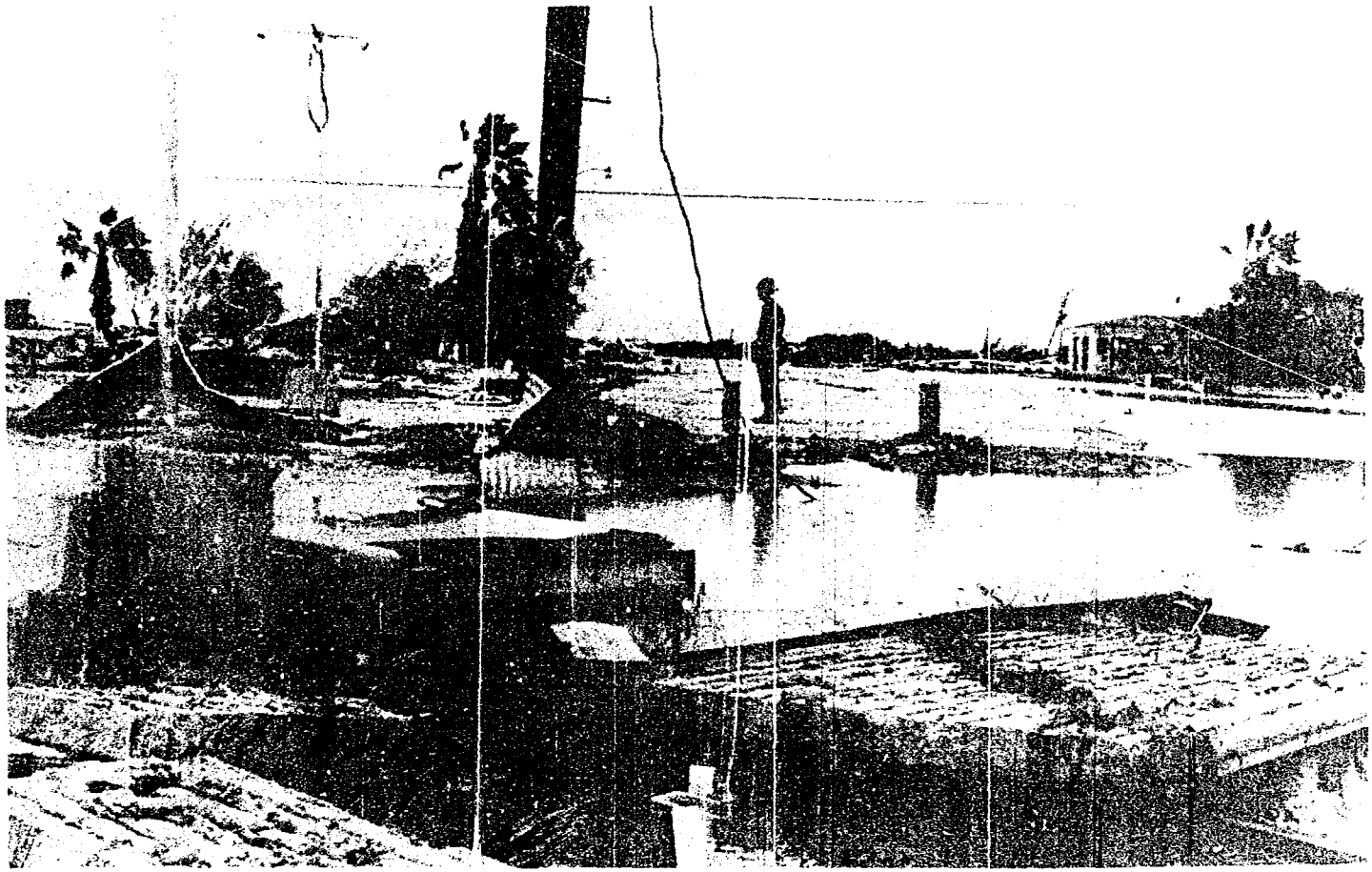
The net effect was that attempts to warn people against returning prematurely to their homes failed to prevent the mass return of evacuees. The fact that reinforcement of warning during this post-impact period was neither systematic nor successful was probably due to the two factors already discussed. First, because there was little systematic reconnaissance of the disaster area, an accurate representation of hazards in the disaster area was not available to be disseminated to the public. Second, because officials did not control the

flow of information to the public, those warnings which were issued were negated by other information flowing over the mass media.

The Control over Return

The major control maintained over return during Hurricane Carla was by means of roadblocks. Since warnings not to return were ineffective in keeping people in the shelter area, the only alternative was to block their way with police power. As already noted, this measure proved only temporarily effective in most areas and, in almost every case, caused conflict and bitterness.

In future disasters, careful control over information flow to the public and systematic reinforcement of warnings could prevent many of the incidents that occurred during the return process in the Hurricane Carla disaster.



Houston Chronicle Photo
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A national guardsman stands guard over the broken foundations of a business building. (Note electric line fallen into puddle).

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

Disaster research is uniquely rewarding, in that the stimulus to social action is clear and unmistakable, the action itself prompt and decisive, and the findings, therefore, less obscure than are those resulting from many other areas of social scientific inquiry. There are, of course, countervailing disadvantages. There is little possibility of conducting the classical before-after type of analysis, or of otherwise guarding against the intrusion of unrecognized or unwanted variables. Moreover, certain personality factors in both the researcher and the informant call for exercise of caution in interpretation of results. These will be discussed below.

Disaster research is particularly significant in that it deals with situations of dire stress which may have drastic consequences, and accords some hope of discovering methods by which these consequences may be mitigated. Further, there is always the exciting possibility that such research may aid in man's perpetual search for better understanding of himself and the world in which he lives. There is also the practical consideration that this research may be of value to policy-makers, whose goal it is to make the continuance of our national way of life more certain.

It would be gratifying to present findings which would clearly demonstrate these rewards. However, the visible results of the research reported here fall somewhat short of this goal. Certain limitations were accepted when this project was planned; others made unexpected appearances as the project developed. Nevertheless, there are also some findings and implications which we believe have genuine value to social scientists and to policy-planners.

It must be made clear that the findings reported here are based on informal interviews with community and institutional leaders, publications of institutions involved and several statistical studies from the tabulated data none of which are included in this report, in addition to the preceding materials. Much, but not all, of this additional material has been used in the complementary report, And The Winds Blew. In both reports only data amenable to discussion in terms of sociological and social psychological concepts has been used.

Researchers in disaster situations find themselves greatly tempted to abandon their role as detached observers for that of advisors to disaster victims. This is a particular problem for interviewers dealing with emotional disaster victims. In such cases, it often appears that the informant could be helped by certain fairly simple understandings of his situation, and by relatively minor changes in his behavior patterns. This temptation is augmented by the philosophy of quid pro quo—that we should not receive unless we are prepared to give in return—as well as by the fairly universal desire to be of service to others. This explains why training in research methodology is as important as skill in research techniques in this field of inquiry.

One caveat concerning the substance of the data should be stated. That is, reports of actions taken some months previous to interviewing, and taken under great duress, may be expected to be phrased in such a way as to confirm the intelligence, knowledgeability and good judgment of the informant. This caution should be kept in mind in considering the findings of this study. It is also true that disaster experience is far enough outside the ordinary sphere of social life that little or no embarrassment is felt in reporting bizarre and illogical behavior. Indeed, one means of conveying the apprehension experienced in a situation is to use vivid and sometimes extravagant descriptive terms, just as the veteran soldier often makes the enemy more demoniacal than objective historians have recorded him to be. This might also be kept in mind in assessing the validity of these research findings.

The argument prevails that attitudes will undoubtedly change over the period of time which intervenes between a disaster event and the time a disaster victim is interviewed. The emotional tone of the attitude will tend to weaken with the passage of time. This means that replies to the questions asked in this research are inaccurate as descriptions of emotional tone at the time of the disaster. On the other hand, the report of less emotional, more established attitudes may be of more value as a determinant of future action in disaster situations, than would an accurate report of the emotional tone at the time of the disaster.

More theoretically, the attitudes expressed to researchers will be consistent with the situation in which the person finds himself at the time he was interviewed. These attitudes may be expected to change from one situation to another. For example, if the respondent was, at the time of the disaster, a great supporter of Officer "X", he will see him at that time as performing his duty very well. If a year later, however, the respondent has become a political enemy of Officer "X", then he will remember many things which Officer "X" did

not do that he should have done, and will give a negative report of his activities in the disaster situation. In both cases the report may be vindicated by references to facts in the situation. The important point is, of course, that whatever attitude the respondent reports is the important datum for research. Whether this attitude reflects the original situation accurately or not is a matter for him and his God, and perhaps his analyst, but not for the researcher.

Summary of Findings

Some of the findings of this study, indicated with sufficient clarity to warrant acceptance, may be stated in abbreviated form:

Evacuation decisions are made by family groups; not by individuals. Any feasible plan must win assent of all "voting members" of the family group. Dissent is likely to be overridden.

Because of neighborhood discussion of the danger, it is to be expected that groups of neighbors will travel together to the same shelter areas and, perhaps, will find shelter together in public or commercial facilities.

Groups of families tend to form spontaneously in shelters, in addition to groups formed on the basis of age, place of residence, and occupation.

Official statements concerning danger appear to be less persuasive than family discussion. The function of official pronouncement seems to be to serve as a basis for discussion in family and other primary groups.

Members of the larger and more authoritarian institutions appear more likely to seek and accept official advice.

Role conflict, or the presence of conflicting obligations, is an important consideration for some persons, but not for others. An expected high correlation between professional status and refusal to evacuate was not found in these data. After a decision has been made, role conflict tends to decrease or disappear. However, in many cases there will be no conflict of responsibilities. In other cases, responsibility may dictate evacuation, as illustrated in the case of a physician whose patients have joined a mass exodus, leaving no one in need of his services.

During Hurricane Carla, word-of-mouth was of little importance as a source of initial warning, even in rural areas. But it must be

remembered that broadcasting of warnings began almost a week before the hurricane struck, and that there was extensive discussion within and outside of the family during that period. Word-of-mouth was probably the most important factor in evaluating formal warnings and developing attitudes toward evacuation.

Most families accepted the advice or orders of officials with good grace. When officials spoke clearly, there was a tendency for discussion to give way to action.

Not only were elderly persons less likely to evacuate; they were also more likely to express a desire not to evacuate.

Those persons who earned higher emotionality scores at the time of interview, seven months after evacuation, had been more eager to evacuate at the time of the hurricane, and had indicated a higher perception of danger.

The higher the income, the greater the likelihood that the family would remain in the home. This probably is related to possession of sturdier houses by higher income families. The low-income group was more likely to remain in the home community, as was the high-income group, than were the middle-income families. The empirical action is similar between low- and high-income groups; the probable explanations are entirely different. In general, the poor went to public shelters. Middle-income families went to private homes, or motels. The high-income families remained in their own homes, or went to homes of friends or relatives, or to hotels or motels. The rich had access to all types of facilities; the middle- and lower-income families had fewer choices open to them.

Local police and the American Red Cross emerged as the two most active agencies in this disaster. The Red Cross, however, rated below most other agencies on the quality of the relationships established with collaborating institutions. Red Cross leaders rated highest in the community power structures. Stereotyping and class structure are both explanatory factors for this finding.

Weather Bureau performance was the most highly rated in this disaster situation.

Some evidence indicates that the more authoritarian the institution, the better its relationships with other agencies. However, it should be pointed out that authoritarian institutions have their procedures and their goals explicitly defined, and these definitions are well known to the other institutions with which they deal. This probably

implies a high degree of consensus between the agencies involved. This point is crucial and is discussed at length later in this chapter.

Evacuation during Hurricane Carla was undoubtedly favored by the fact that the storm came within dangerous range on Friday; subsequent evacuation took place on Saturday and Sunday. This meant that the husbands and fathers were not at work, and less likely to be out of the town of residence or to be engaged in work that could not be interrupted or postponed. Likewise, there was no necessity for gathering the children from their schools. In some cases it was necessary to retrieve husbands from the golf course.

It seems generally true at present that our disaster culture is best developed for dealing with warning prior to impact. This point is given further consideration in the following pages.

The greatest reliance for warning was placed on radio and television (91 per cent), and most respondents (92 per cent) followed the course of the storm carefully.

If Calhoun County, which received the greatest impact, is removed from the total sample, the rate of evacuation and the extent of knowledge about evacuation plans bear a direct relationship to one another.

Women were more anxious to evacuate than men.

Most people thought the full force of the storm would strike them. Moreover, a greater proportion of those who thought it would (42 per cent) than of those who thought it would not (36 per cent) left the community.

Previous disaster experience is associated with evacuation. Examination of the figures shows that persons with previous disaster experience evacuated more frequently than did those without such experience.

Reactions to approaching danger of persons with prior disaster experience tended to polarize. In Cameron Parish evacuation was virtually complete; in Galveston it was very light. Both areas have long and tragic histories of disaster. Prior experience seems not to be the critical factor.

There was a significant difference between ethnic groups in their opinions of danger. A significantly lower proportion of Negroes than of any other group believed that the storm would strike their area.

Spanish-speaking respondents had a higher proportion who expressed the positive "yes" opinion, but a lower proportion who expressed the "might" opinion, about this question of impending danger.

Distances traveled by evacuees were short. In three of the five sites more than half the evacuees traveled less than 25 miles. Only in the case of Calhoun County were the distances traveled often more than 100 miles. This was made necessary by the relatively sparse population pattern over the area. In the case of Cameron Parish, the modal distance reported as traveled would put the evacuees in the Lake Charles area. Swampland occupies most of the terrain between Lake Charles and the ridge along the Gulf Coast.

The small percentages of refugees from Carla who used public shelters should be scrutinized carefully by military planners. In Cameron Parish, where 94 per cent of the refugees left their home community, only six per cent went to public shelters. Similarly, in Calhoun County approximately 85 per cent of the population left their homes, but only 19 per cent went to public shelters.

By way of contrast, in Galveston, the number of persons waiting out the storm in the city, but not in their homes, was greater than the number who went to the mainland. Public shelters were used by 26 per cent of those interviewed. An additional 12 per cent took refuge in the homes of friends or relatives.

The low percentage of refugees using public shelters indicates need for planning a far more extensive program of public care of displaced persons in case of total evacuation of an area for a considerable period of time, as in case of military attack. A part of such planning might well take into account the willingness of citizens to take refugees into their homes, thereby reducing the need for public facilities.

No evidence of widespread panic was observed. This research would once more refute the belief that people abandon their inhibitions—as a drowning man sheds his hampering clothing—when faced with disaster. This belief is an exaggeration of man's inability to apply cultural definitions to the situation; it ignores man's ability to extemporize, a process of finding and using action patterns belonging more appropriately to other stages of his life history.

Newspapers display a rapidly rising interest in disaster, but lose interest very quickly as the dramatic aspects of the situation are replaced by the prosaic activities of replanning and rebuilding. Because of the slowness with which newspapers operate, relative to broadcast media, they could not compete as sources of warning in the Carla

situation and certainly would be of limited use in more rapidly developing crises.

Evacuation or orders and advice to evacuate served to increase discussion in the family and with non-family members about what to do. That is, if a family was contemplating leaving, or was ordered to leave, its members were more likely to discuss their action than if they remained at home.

Urban areas do not have the same kinship structures as do rural areas, and need more public shelters.

The order of priority for shelters desired for any future hurricane is: private homes, commercial shelter, public shelter.

Only 25 per cent of the people in public shelters heard rumors about the progress of the storm.

According to respondents, news was reliable.

Rural residents made more efforts to return home early than did those in urban areas.

Political boundaries in some instances serve as impediments to effective service. The Red Cross, for example, served the Tri-Cities Beach area, just outside the corporate limits of Baytown, from Anahuac, seat of Chambers county in which these residents lived, although each visit or shopping trip required driving some 75 miles. At the same time, social workers and supplies were available a few miles away, in Baytown.

The evacuation effort was facilitated by the miraculous appearance of a high-pressure area northward from the storm center, which had the effect of blocking the forward movement of Carla. This delay of the storm enabled the people along the coast, in most cases, to use as much time as they felt was needed to make preparations for leaving their homes; to collect and evaluate information; to discuss the situation with friends and relatives; and finally, to come to a decision about evacuation. The high-pressure area also meant that the expected point of impact was steadily moved westward, so that the orderly evacuation noted above was more to be expected in the Louisiana and eastern Texas sites than in Calhoun County; our data indicate that this occurred. Cameron Parish and Jefferson County had the most effective evacuation programs of any of the areas for which data were secured.

Theoretical Implications

Differential response to a stimulus which appears to be the same for all persons and communities exposed to it sets a problem for future research. It may be hypothesized that the difference is attributable to the various meanings given the stimulus by those exposed to it; but this hypothesis would beg the question. In order to determine the cause or causes of differential response, personality characteristics must be delineated, and the source of these characteristics must be identified in the family and community culture as well as in the unique history of the individual. Only through these means can any useful theories be formulated about prediction and control.

This study was not designed to get at the long-term health effects of the hurricane, but the amounts expended by the federal government, under provisions of Public Law 875, plus undetermined further amounts spent by local governmental units on insect and rodent control problems, afford vivid testimony of the continuing effects of such an event. Other studies have explored this topic systematically, and their evidence is that biological and psychic effects may be detected for an indefinite period of time; but certainly as long as eight years after a major disaster experience (Blocker, et al., 1959; Moore and Friedsam, 1959; Moore, 1958a; Perry and Perry, 1959).

There was a dimunition of symptoms among some neurotics and psychotics in the face of the Carla emergency, as shown in the records of the University of Texas Medical Branch in Galveston, and in some case-study material. This finding corroborates existent theory growing out of the studies of effects of bombing, i. e., that emotionally disturbed persons are likely to show improvement when they are given the feeling that they are doing important work or taking part in an important enterprise.* The need is indicated for further study of the duration of such improvement. Some available evidence from this and other studies suggests that such persons usually revert to their former states within a matter of some months. It has also been noted that many of the emotional symptoms traceable to disasters may not appear for months or even years after the event. Careful follow-up studies of such cases are necessary before any firm generalizations may be made.

*This observation was made by the psychiatric staff of The University of Texas Medical Branch in Galveston, but is also based on considerable research into this area. For instance, according to R. D. Gillespie (Gillespie, 1947, p. 147): "One of the most striking things about the effects of the war on the civilian population has been the relative rarity of pathological mental disturbances among those exposed to airraids."

Though it was not obtained for this report, a fairly accurate measure of the degree of impact of a disaster on the family may be calculated by dividing the annual income by the amount of loss. The result will be in proportion to the ability of the family to absorb the loss, rather than to the absolute amount of loss. This device was developed and used in the study of impact of disaster on families by Fred R. Crawford (1957) as a part of the Waco-San Angelo research conducted some years ago.

If personal suffering or property loss can be rationalized as a sacrificial contribution to some prized value, as to national survival during warfare, the impact appears to be greatly mitigated. This may be an essential difference between the reaction to warfare and to disaster.

The theories of Arnold (1961) that emotional upset results primarily from a sense of inadequacy in meeting the existing situation, and of Killian (1952) and Slotkin (1952) that role conflict and the presence of non-related behavior patterns are important factors in explaining personal behavior in disaster, find some, but not overwhelming, support in these data. While these factors are significant, they do not of themselves constitute an adequate etiology of behavior in disasters.

There is no evidence in these research findings to confirm the observation of Danzig et al. (1958, pp. 78-79) in their Port Jervis study that "...evacuation was no more likely when the source of the alarm was official [than] when advice to evacuate was included in the threat message." The situation in the case of Hurricane Carla was, of course, very different, in that the concern here was with people who were fully aware of the reality of imminent danger. Danzig et al. were dealing with people who had ample grounds for being skeptical of the validity of the warning. These findings, therefore, cannot be taken as a refutation of those just cited. The conflict between the two findings underscores the need for further research into the conditions under which warnings are or are not likely to find acceptance. The work on reaction to false alerts, summarized by Mack and Baker in The Occasion Instant substantially advanced inquiry into this problem.

The meaning of the disaster situation, and the decision to evacuate or to remain in the danger area, depend not only upon such objective factors as Weather Bureau reports and knowledge of past storms, but also upon the subjective evaluation of such material. This subjective evaluation is based upon the actor's estimation of the expectations of others, the alternatives which are thought to be feasible, and the observation of significant actions undertaken by others in his reference groups.

The Holland Flood study indicated that, in a disaster, the behavior of people depends to some degree upon their former experiences with threats of similar nature: "The tendency to refer to former similar experiences, which actually were of another nature or less serious, can be a great disadvantage" (Ellemers, 1955, p. 67). This proved to be the case in Galveston, but not in Cameron Parish, during Hurricane Carla.

The fundamental function of culture is to provide the individual with a set of values that define his life experiences. When values are applicable to disaster situations, they are implemented in an interpretation of them; but inappropriate action often results, since the disaster is outside of the cultural definition. When, however, disaster is incorporated into the culture—when a "disaster culture" is developed—definitions of the situation obtain and are applied. The effect of these definitions is a substantial reduction of the impact of the disaster both emotionally and physically, and in terms of the value of property destroyed. Fairly clear evidence was found which indicated the existence of such a disaster culture, particularly in Galveston and in Cameron Parish.

When everyone has experienced the same disaster, the differential effects which may be observed are minimized. The disaster experience becomes a part of the normal set of experiences of the personality. This suggests that what is measured in an area repeatedly subjected to hurricanes, for example, may not be so much the effect of the hurricane experience as the differences in personality and cultural patterns displayed in response to the stimulus of the hurricane.

A desire for information about their home communities was perhaps the most vocal of all needs of the people in shelters. A reporter from Freeport told of having listened to accounts of the mounting dangers in his home community, until finally the radio announced that the last persons had evacuated, and "Freeport is left to the wind and the water." A man in an Austin shelter repeated over and over as he listened to reports about the storm, "But I want to know about Clute. What's happening to Clute?"

Evacuation conditions during Hurricane Carla are comparable to those which prevailed during the Holland floods. The researchers who studied this disaster noted the same desire for information about the home town as that expressed by Hurricane Carla evacuees (Ellemers, 1953, p. 53):

> Some phenomena illustrate clearly this focusing on the old village. In the first few weeks after the disaster, persistent rumors were heard about thefts in

> the flooded village. Actually, only very few thefts had taken place. The emotions of the people, however, were focused so strongly on the possessions that had been left behind that the slightest cognitive indication...gave occasion to a "flood" of rumors.

In some places along the coast, local officials complained that broadcast stations had advised refugees to return to their homes—that they were needed there for "clean-up"—when the communities were isolated by roadblocks set up by the local authorities to keep all persons, including property owners, away. One official characterized this as the "biggest weakness in the whole operation" (Treadwell, 1962, p. 51). This was also found to have been an important factor in the Holland Flood evacuation of 1953: "The village appealed strongly to them and whenever possible people tried to move on to an address as close as possible to it" (Ellemers, 1953, p. 53).

Administrative Applications

If due allowances are made for the particularly favorable circumstances under which the Carla evacuation took place, and if it is realized that the repetition of these circumstances cannot be reasonably anticipated, the experience with this hurricane seems to indicate that the military would be well advised to make a careful appraisal of evacuation as a means of saving civilian lives in the event of nuclear warfare.

Above all, this study demonstrates that great masses of people can be moved with a minimum of injuries or panic. Highway accident rates actually decreased during the period of evacuation.

Civil defense planning was shown to have had high value in meeting the emergency and in keeping the number of casualties at a minimum. These data indicate that civil defense might well become more active, particularly in planning for collaboration with other institutions during emergencies. In the case of Hurricane Carla, there seemed to be some confusion as to whether civil defense should function as an action institution, or confine its role to that of a coordinating agency. The latter is the sole function ascribed to civil defense by current Texas law. Legally it is purely a "staff" agency, though in emergencies such as Hurricane Carla it appears to have operated more actively than such designation would lead one to expect.

During Hurricane Carla, the number of meals served was consistently greater than the number of persons in shelters. Some of this

oversupply may have been taken up by local residents intent on securing a few free meals; however, interview material indicates that many refugees slept in commercial facilities or in the homes of friends and relatives and ate at public shelters in efforts to reduce the financial burden on themselves or their hosts. This would indicate the need for greater planning for mass feeding as compared to planning for dormitory facilities.

Reports indicate that, initially at least, refugees were received and housed without regard to race. However, where the pressure was not great, Negroes and Caucasians were commonly assigned separate shelters. This appears to have been the case throughout the operations in Austin, Beaumont, and Lake Charles, for example.

Police feared the effects of drinking alcohol in shelters, and in two counties, at least, prohibited the sale of intoxicants for the duration of the emergency period. A sheriff who did so said, "I don't know if I had the authority, but I told dealers I would throw them in jail on a second offense." But in Corpus Christi, it was informally agreed that police action in separating a group of "winos" from their supplies (brought to the shelter by the refugees) simply substituted delerium tremens for the quiet stupor in which many of them had rested.

Further consideration should be given to current arrangements whereby operation of shelters and similar duties connected with evacuation are assigned to the American Red Cross in disaster situations, but allocated to state welfare departments in time of military operations. The training value of disaster exercises would seem to be diminished under this arrangement. But parallels between a disaster, such as Hurricane Carla, and military attack are so great that it is believed that much that was learned could be transferred to the man-made disaster situation. The action of the Red Cross and the state welfare organizations in working together very closely during Hurricane Carla, and the joint training undertaken by the two organizations, lessens the possibility of loss attendant upon the transfer of operational duties to the state agency.

Newspaper content indicates that the American Red Cross and the federal government are the primary and most powerful forces in dealing with disaster. This is true despite the familiarity of newsmen with local news sources, which tends to give undue prominence to activities of such local sources as municipal, county, and state officials and organizations.

The fact that supervision of shelters was lacking appears to have had costly effects. The sex activity reports found in The Winds

Houston Chronicle Photo
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No hurricane ever stopped the basic social processes.

Blew provide an example of the effects of absence of supervision. Another example is the occupancy of a Houston school by some 200 unauthorized persons. Soft drink bottles were smashed in the hallways, cafeteria walls splattered, obscenities scrawled on walls, supplies stolen, and a flag burned.

As a result of the Carla experience, Texas civil defense has inaugurated a shelter-manager training program, with the objective of having at least three trained persons available for each potential shelter.

Of course, supervised shelters were not free of problems. But the problems presented were relatively minor in most cases, and discipline was imposed where needed without too great difficulty. One problem for which there appeared to be no solution was the disappearance of blankets when the refugees left the shelters. However, as one official commented, "We might as well let them take their blankets with them as to gather them up, ship them to the towns those people are headed for, and then give them out again."

Although officials disagreed as to the types of communication facilities needed, they were unanimous in their belief that effective and rapid communication was absolutely essential in any operation such as that put into effect during Hurricane Carla. In Texas, reliance was placed on the teletype and telephone; in Louisiana, voice communication was felt to be impossibly slow, and radio teletype, using magnetic tape, was strongly advocated. The national emergency warning system was used only sparingly, but was regarded as potentially very valuable.

Post-Disaster Warning

Warnings were handled with great dispatch from the time of suspicion that a hurricane was forming until the time it had passed across the nation. But with the passage of the storm into the Canadian wilds, the need arose for another type of warning and informational program. The existing program, which had not been planned, was, in consequence, ineffective. The type of warning needed in this instance would pertain to conditions in the devastated areas, and the dangers to be found therein which made immediate return impossible or so hazardous that the public welfare demanded that it be prohibited. Clearly, this was not a proper function of the Weather Bureau, as was the detection and prediction of movement of the storm. Perhaps the weakness of warning apparatus was due to the fact that no agency was specifically invested with this duty, and no agency had either the equipment or the trained personnel required for this task.

The matter of post-disaster warning appears to constitute a hiatus in disaster research as well as in disaster relief work. The dramatic qualities of the flight from the impending blow, or the sudden impact of devastating forces, have commanded so much attention, that events subsequent to them have paled into insignificance; at least, they have not been studied. So far as we know, the study of the 1953 tornadoes in San Angelo and Waco (Moore, 1958b) was the first such study conducted by social scientists in which any effort was made to follow up rehabilitation. In this study, it was found that the mayor of Waco was not aware of what had happened for some time. This was attributed to the fact that he was isolated at the time of impact. It was found, through interviews with survivors, that the latter had no clear idea of what had happened some hours after the disaster, but this evidence was dismissed. Later, in a study of Hurricane Audrey, it was noted that no one had any reliable information about such matters as the extent of property damage or loss of life for some weeks after the event. Again, this lack of information was dismissed and, in this case, imputed to the geographical factor of the marshy terrain between the coastal ridge and the firm land some twenty miles inland.

In view of the great difficulty involved in the efforts to prevent premature re-entry of residents to coastal areas following Hurricane Carla, it would seem to be essential that more attention be given to this problem of gathering and disseminating information about devastated areas. This information should include warnings to those who desire to re-enter such areas. Perhaps photographic reconnaissance of the type used to detect missile sites in Cuba could be used; perhaps surveys on the surface would be required. In this report, attention can be directed to an apparently serious deficiency in practices in disaster situations of this type; remedial action can be undertaken only by the operating agencies.

Community Problems

A need is indicated for further and specialized consideration of essential community functionaries in disaster planning. These functionaries would include police and other political officials, civil defense and Red Cross officials, the clergy, physicians, lawyers, utility operators, and perhaps certain others. Determination of the conditions under which such persons should or should not evacuate, or whether some members of the occupational category should and others should not evacuate, should become a part of planning for emergency action at the community level.

A recurrent observation was made of confusion about the proper channels for requests for assistance. Local officials tended to ask military personnel for extensions of their services, and to request the impossible. Local officials also complained that the military was obstructed by excessive formality and insistence on proper protocol, particularly in those cases when the military person replied to requests by saying that the needed activity fell under the jurisdiction of some other service branch. There appears to be a real need for systematic coordination of military aid and perhaps a concentration of authority in one person's hand in emergencies such as Hurricane Carla. The limitations on the use of such aid appear to be a crucial matter for the local communities.

The need for vehicles capable of operating in water became evident early in this emergency. The motors of trucks of ordinary height stalled when their fans threw water over the spark plugs, or when water entered through the crank-case breather. The crew of one stalled truck fended off snakes, while five other vehicles tried in vain to reach them. "That is why we began to scream for amphibious vehicles," a city official explained. Ordinary vehicles were also ruined when immersed in salt water; because of this, no police cars were available for use in Galveston and Texas City.

The policies of industrial corporations pertaining to the use of their equipment varied considerably. These policies ranged from, "What do we have that you can use?" to "What are you paying for this type of equipment?" According to one official, the latter predominated among out-of-town concerns. The equipment supplied through Associated General Contractors required payment, and a local official complained that, "Only when they got an order from Austin would they move." State civil defense headquarters preferred this equipment to that of military units, on the grounds that it usually was more accessible, caused less disruption of military routine, and allowed for the employment of local personnel.

Local officials pointed out that if requests were to be quickly met, specific instructions were needed as to the type and destination of machinery desired. They also felt that, if existent supplies of materials donated to local units by the federal government might be transferred from one political unit to another, with assurance that the first unit would be given replacement, they would be able to proceed more expeditiously. The state took the position that it could not ask for such transfers, since the supplies had been made the property of the local political units, and neither the state nor the requesting units had funds with which to purchase these materials. Small communities, they asserted, could not afford even the minimal charges made for

military surplus materials; hence these should be transferred without cost to local Civil Defense or other agencies, so that they would be available for emergency use.

Power to Order Evacuation

Police power to order and enforce evacuation in face of grave danger is badly needed. Our study seems to indicate that at least a part of this problem lies in the fundamental philosophy of the political authorities rather than in the nature of the existing laws. Texas police officers point out that a declaration of martial law is necessary to give them power to go into a man's house and force him to leave, no matter how grave the danger may be. But during the emergency when some coastal officials asked for martial law, the state-level officials, including the governor, worked hard to persuade them to withdraw their request. Texas police officials also agreed that nothing in the existing law could prevent their going into a home and "advising" evacuation as strongly as possible; or, for that matter, of forcibly evacuating any person found outside his home. But, again, the official policy of state officials in Texas was to refuse to impose any higher authority on local officials. In Louisiana, authority to order evacuation is held by state officials without the imposition of martial law, and was used in the Hurricane Carla emergency.

Texas civil defense and Department of Public Safety officials pointed out that the problems of evacuation and of re-entry are not quite the same, since there is ample legal backing for setting up roadblocks and preventing home owners from returning to their homes if there is reasonable basis for the belief that such return is dangerous and unwise. In contrast, there is no way under existing law, these authorities said, in which a resident may be forced to vacate his home. "Our legal structure still holds that a man's home is his castle and can be entered by no one without his permission or formal court action or under provisions of a declaration of martial law. Forcing a man from his home under other conditions would lay an official liable to prosecution for false arrest. Once we get a man out of his home, we can keep him out without legal difficulty; but we cannot force him out if he stands on his right to stay" (Interview, Texas Department of Public Safety).

Davis (1949, p. 14) points out that decision within a social system is handled by institutionalized power, which ultimately is political:

> ". . . there must be a political organization and there must be people in authority. A society can

> exist with a tyrant, a king, an elected president, or a gangster at the top; it cannot exist with nobody at the top. . . ."

Clearly, the problem of police power during emergencies is not only one of the locus of authority. It is also one of the political feasibility of exercise of authority which is held nominally, but also one of legitimizing its use. As Barnard (1947) points out in his Functions of the Executive, it does not suffice for an administrator to have power vested in him; it is also essential for the exercise of that power that those to whom it is directed recognize its exercise as legitimate. In every municipality there are ordinances which are not enforced because an attempt at enforcement would result only in ridicule. Recently, for example, young women in a Texas city complained that they were accepting illegal compliments when their masculine friends winked at them on the streets, but added that the matter of legality did not interfere with the practice. The case of the prohibition amendment to the federal constitution, or of certain highway traffic laws, might be added to the list of laws that have been undermined by a lack of acceptance. The attempts at racial integration of some southern schools in 1963 might be offered as still another example of this phenomenon.

Imposed Authority Versus Local Initiative

Although the records indicate that the population of Cameron Parish was ordered to evacuate, the order was not issued until after the majority of the residents had left the parish. The statistics indicate that only 14 per cent of those interviewed in this area said they had been ordered to evacuate, whereas 17 per cent of these people said they were neither ordered nor advised to evacuate. The key to these statistics is, of course, the progressive evacuation. Those who were neither ordered nor advised left before orders or advice were formally issued; the 65 per cent who reported that they were advised to leave did so between the issuance of such advice and the formal order to evacuate. Thus, only those who were slow in leaving and were sought out by officials reported that they acted under evacuation orders.

In Cameron Parish, well over 95 per cent of the residents left their homes and wholeheartedly accepted the judgment that evacuation was necessary. It is to be noted, however, that the evacuation order was not issued until after almost total evacuation had taken place. Political difficulties have plagued this area since the disaster, and these troubles appear to have originated at least partially in the

exercise of police authority to move persons from their homes, and to prevent them from returning when they desired to do so and thought they could without undue danger.

Imposed authority versus local autonomy--this dichotomy clearly lies at the heart of the evaluation of events during Hurricane Carla. It is seen most clearly in the discussion of the legal authority, and political consequences, of evacuation and re-entry policy. In this study it is accentuated by the divergent policies of the two state governments involved. But comparisons are tenuous, inasmuch as data are available for only one Louisiana parish, which had undergone a drastic experience with another hurricane in 1957.

In Texas, the state resolutely followed a policy of placing the responsibility for evacuation, roadblocks, and all other possible actions on the local officials. These functionaries, in turn, delegated much responsibility to the families and persons involved. This was done in Galveston County by failing to announce any firm policy. In Jefferson County, advice tantamount to evacuation orders was issued. Action in other communities fell between these two polar types. It must be noted that Jefferson County earned the reputation of having run a model operation, as it had years before under the same leaders in Hurricane Audrey. Galveston County, with a policy approaching laissez faire, seems to have had more problems, and to have met them less successfully than did any other Texas county.

According to Homans (1950, pp. 428-429), "When a choice about the next move to make lies before a group, the members will expect the leader to consult with them, but they certainly expect him to take action. . . . The leader, whatever his rank, with whom decision rests must in fact decide."

Because of the fear of political reprisals, local officials are understandably fearful of any situation which calls for a sudden drastic increase in their arbitrary exercise of control of actions of constituents. Politics is perhaps most fundamentally a matter of quid pro quo, of reciprocity. But in a roadblock situation, for example, the action required appears to consist wholly of denial by the official, with any advantage to the person denied being highly speculative. What is needed to ease the situation, is the right of officials to deny reciprocity in such situations. This right is a part of our legal structure, of course, but is not part of our "working constitution." If it can be established firmly that a disaster, like a military operation, is so clearly outside the normal course of social events that customary norms are not applicable, perhaps the local official can be removed from the dilemma that tends to prevent taking needed action.

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Divergent Policies

Since the Texas civil defense agency abstained from imposing authority, reliance was placed on the voluntary cooperation of the various state agencies with functions pertinent to disaster operations. The Division of Defense and Disaster Relief acted as a coordinating office. This meant that all requests for assistance flowed through this branch of the Governor's office, and were then referred to the agencies directly concerned. Thus, the state police and highway departments, each with its own radio communications network, operated for the duration of the emergency through the state control center of the civil defense agency.

Prompt and successful evacuation of Jefferson County along the Louisiana-Texas state line, and the even more successful evacuation of Cameron Parish just across the Sabine River (the state boundary) were certainly contributory to the success of efforts to evacuate persons further down the Texas coast. In Chambers County, next door, the evacuation was very closely related to that in Jefferson County. Less significant results flowed from the actions of civil defense directors in Baytown and Calhoun County. In Galveston, however, in both city and county, the example of Jefferson County was not accepted as a model to be adopted. In Galveston, civil defense and other officials contented themselves with advising the residents of threatened areas (practically the entire county) to evacuate, or to take such protective measures as they thought appropriate. Further, planning and coordination of plans for disasters appear to have lagged in this county. As a result, last-minute efforts were made by local officials to achieve evacuation through such means as fire alarms and cars with loudspeakers. As might be predicted, such efforts were not notably successful.

Texas state police officials felt strongly that the contrasting rates of evacuation in the various areas were directly related to the actions of local police officials; and used Jefferson and Galveston Counties to illustrate their point. In Galveston County, no official ever made a direct request that citizens evacuate. In Jefferson County, officials from the municipalities met with county officials and determined on a policy of using as much pressure, short of force, as possible to secure evacuation of danger areas. Further, they agreed that each would support any of their number who found himself in trouble because of such actions.

At the state level no requests were made that any areas be evacuated. "We advised local officials on conditions, but we did not do any advising on evacuation" (Interview). The Texas Department of Public

Safety has legal authority to take over all police work in emergencies, but has never done so. In disaster situations state police officers often assume direction of police action in circumscribed areas, but this is done only at the request or with the permission of local officials. A state police official may confer with local officials and give suggestions as to what should be done, but any action taken is always in the name of the local authorities, and state police withdraw as quickly as possible, officials insisted. This policy led to a wide range of reactions by local officials. At all levels it was agreed that in dire emergencies people must be given orders by governmental agencies, but that the governmental agencies must have authority to issue such orders before this can be done. Without such explicit authority police officers lay themselves liable to prosecution on a variety of charges.

Political and Social Considerations

In Louisiana, the Governor announced that areas in immediate danger would be evacuated "...by the National Guard in order to prevent the repetition of the tragedy caused by Hurricane Audrey." A Civil Defense official argued that "children are entitled to protection; adults can drown if they want to. Saving lives is more important than violating a father's civil rights" (Treadwell, 1962, p. 10).

In general, local officials were reluctant to force people to leave their homes. One official was candid about a powerful deterrent: "Politics is one of the biggest problems involved in evacuation. Remember that a sheriff has to be elected every four years, and when he forces someone to evacuate he is not making friends. Persons doing the evacuating job should be either state or federal forces brought in at the request of local government officials" (Treadwell, 1962, p. 10). One informant declared that the sheriff of Cameron Parish had carefully waited until most of the residents of his area had evacuated before issuing an order that they must do so.

Police were much less reluctant to forbid re-entry than they had been to enforce evacuation. With little hesitation they set up barriers against the evacuees' return to deserted homes after the hurricane had passed.

The legality of roadblocks by local authority was defended by Governor Daniel of Texas, as well as by most law enforcement officials. The Governor asserted that, even when their right to protection was waived, citizens could and should be prevented from returning to dangerous areas: "The 'own risk' argument for return is not valid; the city must protect citizens" (Treadwell, 1962, p. 53). The

argument most commonly used was that the police have power to protect citizens from danger: "No right exists for people to jeopardize their lives" (Treadwell, 1962, p. 53).

Various expedients were used in the effort to meet the problem of keeping persons out of dangerous areas. These included the frequent issuance of bulletins giving official information on the state of affairs; access to the devastated area by a limited number of persons, on a temporary visiting basis, who were charged with the duty of reporting to others who were not permitted to enter; re-entry by males only; re-entry only by the display of passes signed by a designated authority; re-admission of residents only. None of these measures were wholly satisfactory, since the pressure for total re-admission increased when it was allowed on these restricted bases.

The theory that local authorities would take the initiative, both in making preparations for the emergency and in requesting needed assistance, appears to have resulted in erratic levels of performance. One community requested federal aid before the storm struck; others, where aid was obviously needed, did not know to whom application for it should be directed. A need is indicated for a more concise program of local, state, and national cooperation during disasters.

In explanation of his reluctance to accept a blanket declaration of the Texas coast as a major disaster area eligible for federal assistance, Governor Daniel said, "Some counties have asked not to be declared disaster areas if they could help it. Some have told me that because they were not hit as badly as others, they feel the help should go to others." The Governor added that his office had had unfavorable reactions to such declarations made without requests by local officials, backed by sufficient proof of need. In the spring of 1963 the new state director of civil defense commented that the same attitude was quite apparent with reference to the declaration of disaster areas because of drought. He had had "several" protests at such action being taken by some county officials without sufficient justification in the opinion of the protestants.

Function of Norms

The dichotomy between imposed authority and local/personal responsibility is not solely a matter of whether or not socially accepted norms are present in the culture. In cases in which the situation has not been culturally defined, and no norms have been established, the person is necessarily forced to assess the situation by any means available to him, and to arrive at a decision on the basis of this

assessment. This is the situation which would prevail in the case of nuclear attack; it would also obtain in areas or among persons not well acquainted with the disaster agent, whatever it may be. In the case of Hurricane Carla, however, the difference between Jefferson and Galveston Counties would seem to be in the locus of the norms rather than in their existence. In Jefferson County much civil defense planning had been done, and the plans had been accepted and enacted by the local officials. A definite norm of public responsibility for these functionaries had been established. In contrast, in Galveston County civil defense plans were ambiguous, they had not been accepted—even on a formal basis—by local officials, and some of the key civil defense officials were very new in their jobs and had had no opportunity to establish informal concurrence with the official plan. This resulted in seriously divided authority operating through multiple "headquarters." There was no norm at this level. But there was a norm well established in the folk culture of the area: only cowards flee before a storm; manhood is attested by facing the danger and defying the forces of nature. This was the norm in terms of which the situation was defined by many of the people, seemingly even by the officials of the county. The difference in the operational norms in the two areas seems to suffice as an explanation of most, if not all, of the differences in the observed behavior.

The implication of this finding for military planning is entirely clear. In emergencies where there are no norms, or where the prevailing norms are not in accord with public policy, authority must be promptly imposed. Further, it would appear that the most efficient way of meeting a situation approximating anomie would be to utilize the services of existing institutions, wherever this is at all feasible.

As Williams and Ryan have observed, power not specifically allocated in the social structure "gravitates to the active and continuing control centers of the executive agencies" (Williams and Ryan, 1954, p. 233). This is a specialized case of the general tendency toward wide control in formal organizations, when rapid action is imperative, and particularly when the social system is under threat.

If these researchers may be allowed a personal word, we would like to say that this finding is disturbing. We certainly would have preferred to find that the democratic policy of supplying information and leaving decision to the persons involved is the more effective method of meeting such crises. In fact, before beginning the study of disasters, it is probable that most of us would have asserted that a democratic procedure is more effective. Hence, it is with some degree of reluctance that we are forced by the logic of our observations to record our judgment that an authoritarian procedure appears to be indicated—indeed, demanded—in the situation described above.

The evidence from this study is suggestive of a generalization that may be stated in these terms: Democratic, permissive leadership is effective, and desirable from the viewpoint of traditional American values, in those situations where conditions are well understood, where the culture has provided a set of norms from which may be chosen one, or several, acceptable modes of action; and where the actors are aware of these alternatives—that is, where there is an understood social definition of the situation. But where those conditions are not present, the actors lack the customary guidance on which they depend in making decisions, and it becomes incumbent on the leadership to act on behalf of others by imposing authority and making decisions. This follows from the accepted theory that the primary dysfunction of disaster is to render ineffectual the established action patterns of persons and to exert a "tremendous disruptive impact on functioning social systems" (Moore, 1958b, p. 310).

Perhaps the imposition of outside authority is essential to overcome the frustrations resulting from the feeling that nothing can be done—that the situation is hopeless. These feelings are a natural consequence of the disruption of the social fabric and of individual behavior patterns. When autonomy is impossible, an outside authority must step in and initiate a new course of action. By submitting to such an outside authority persons whose sense of direction has been destroyed may regain their ability to act purposefully and the social system may begin an acceleration that will restore a state of dynamic equilibrium at a level equal to, or even higher than, the one destroyed. That is, as rehabilitation and reconstruction proceed, members of the community may discover opportunities for creation of a social system that will surpass the former one in satisfactions achieved. Something of this sort seems to be implied in the series of quotations from community leaders discussing the long-range impact of Hurricane Carla: "You go through a spell of depression—then you see what you can do." "Nothing can be done about what has already happened. The past is over...there is no use to get upset about it." "You get cynical about people. Something like this restores your faith in humanity. People have more sense than you thought they had." "We're really proud of the people—didn't know they had it in them. Believe that by spring it will be hard to tell that anything happened in our town."

APPENDIX: METHODOLOGICAL NOTE

This methodological note is intended to add some essential details to the discussion in Chapter I. There the reasons for selecting the five sample areas were discussed and the general procedures were outlined. In this appendix some of the more pertinent facts about field work procedures will be presented along with an analysis of the characteristics of the sample.

Field Work Procedures

Conducting a field study which covers parts of two states and five counties including two large cities presents major problems in management and coordination. Field work for this research was conducted by teams. In four of the five areas (Calhoun County, Baytown, Galveston, and Cameron Parish) well-trained local supervisors were appointed. These local supervisors selected and supervised interviewers and established and maintained contacts with local leaders. In Chambers County no such person was available and the Texas project director assumed direct supervisory responsibility there.

In Texas, Dr. John M. Ellis of the Medical Branch of the University of Texas at Galveston and Mrs. Terry McLeod, executive officer of the Galveston Mental Health Association, acted as field work supervisors and coordinators in Baytown and Galveston respectively. In Calhoun County, S. Thomas Friedman, Research Associate at the University of Texas, and Mrs. Mary Chatterton of the Calhoun County Social Welfare staff, managed the field work operation. In Cameron Parish, Dr. C. W. Fogleman and Dr. Robert H. Pittman, both of McNeese State College in Lake Charles, supervised interviewing operations, and conducted interviews themselves with key leaders.

At each site the interviewers were assembled for a training period in which each interview schedule was explained in detail and questions raised by the interviewers were answered. This training period was conducted by the project director in three sites, and by the research associates in two sites. After the first one or two interviews, each worker was asked to come in for further instruction if any problems arose to plague him. For this consultation, the local supervisor was responsible. After the interview schedules had been

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A Galveston couple reclaim one of their treasures.

collected, they were edited by the local supervisor before being sent to the office in Austin or Baton Rouge for processing.

Drawing samples for the four sites presented the usual problems. The study was designed to get at action by families rather than by individuals. Hence, the pertinent census data were the number of households in each site rather than the total population. Actually, this difference turned out to be more nominal than real, since in Chambers County only three persons were enumerated by the census as living "in group quarters," and only 2, 164 were so listed in relatively large Galveston. However, it should be noted that our sampling design did not take these persons into account. It is possible that the responses of persons not members of households would differ significantly from those of persons living in households. The differences, if they exist, are not delineated in this study.

Four different methods were used to locate the households in which interviews were taken. In Baytown and Galveston, postal authorities furnished the project with carrier route sheets showing each address at which mail is delivered (Form 3999). The total number of residential addresses in the delivery area was obtained from the forms. This number was then divided by the number of interviews desired from that site to establish the interval to be used for selecting interview addresses. Business houses were eliminated and each apartment in multiple dwellings was treated as a separate household.

Households were then counted and the block in which each interview was to be taken was determined. The house at which the interviewer was to call was located by selecting from a table of random number one which was smaller than the total number of households on both sides of the street within the designated block. The interviewer was instructed to enter the block from the direction of his last interview and then to count the households on his right or left, alternately, until he had reached the number designated. If he reached the end of the block before counting this number of houses, he was instructed to cross over and return on the other side of the street until he came to the assigned house. Thus, each interview was conducted in a designated block, chosen so that the entire area was covered in proportion to the density of occupancy and in a house chosen in accordance with arbitrary procedures. By this formula, each block and each house in the area had an equal chance of being designated. This was equally true for the selection of homes in the rural counties. However, it appears from the schedules returned that the interviewers did not follow the formulae rigorously.

In Chambers County, estimates were made from current state highway department maps of the number of households in each of five districts of the county. Next, a quota for each of the districts was calculated by determining the percentage of all households in the county located within the district and assigning this percentage of the total number of interviews desired to the district. Interviewers were instructed to travel along streets and highways to the Nth—in this case the 15th—house, where the interview was to be taken.

In Calhoun County, the corporation supplying electricity supplied a list of names and addresses of customers. From this source a stratified sample was drawn representative of the urban-rural, ethnic, and racial characteristics of the population. Each interviewer was then given cards bearing the names and addresses of the families he was to interview. In Calhoun County, every 18th household was chosen.

In Cameron Parish a preliminary field survey was made using state highway department maps showing "culture." Every household in the parish was counted and checked against maps. Then the parish was divided into seven sample segments each representing a homogeneous geographic and socio-cultural unit. Then interviewers were instructed to start at a given point in each segment and to interview at every 10th household, counting houses on both sides of the road.

All the samples are large enough to meet statistical criteria of adequacy. The largest number of interviews, 504 usable schedules, came from Baytown, where the Texas State Department of Health, which sponsored a special study, specified a five per cent sample. Four hundred households were interviewed in the city of Galveston. In Calhoun and Chambers counties, interviews secured numbered 200 and 204, respectively. In Louisiana, a total of 208 interviews were conducted, 192 in Cameron Parish and 16 in Pecan Island in adjoining Vermillion Parish. In addition, 18 households were interviewed on the Bolivar Peninsula, politically in Galveston County but functionally a part of Chambers County.

Adequacy of the Sample

In the following paragraphs the sample used in this study is compared to figures obtained from census data. This comparison of the sample with population statistics is not exact for the following reasons:

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Adequacy of the Sample

In the following paragraphs the sample used in this study is compared to figures obtained from census data. This comparison of the sample with population statistics is not exact for the following reasons:

Table A. 2. Sex, in Percentages*

Communities	Male	Female
Baytown (N-957)		
Sample	48.6	51.4
Census	48.5	51.5
Calhoun County (N-375)		
Sample	48.5	51.5
Census	51.5	48.5
Cameron Parish (N-398)		
Sample	50.0	50.0
Census	51.6	48.4
Chambers County (N-380)		
Sample	48.4	51.6
Census	50.2	49.8
Galveston (N-707)		
Sample	46.1	53.9
Census	48.1	51.9

*The main difference between sample and census is that census includes all persons over 18 years of age while sample includes only heads of households and their spouses.

How well do these samples represent the total population of the areas where interviewing was done? There are some obvious differences; but most of these are logically connected with the fact that the interviewing was done with heads of households only, while the census figures with which they are compared include the entire population. This means, of course, that the samples are concentrated in the home-owning, married, child-rearing sections of the population. Such family heads are to be expected to show higher percentages married, to have higher percentages in the middle years, to have incomes in the middle ranges, to have more years of education, to show a tendency to occupy professional and managerial occupations, a lower percentage of urban females employed, a larger number of children per family, and a lesser representation of Negroes and Spanish-speaking persons. Most of these characteristics do appear, as predicted; but there are some anomalies.

Table A. 3. Marital Status, in Percentages*

Communities	Single	Married	Widowed	Divorced	Totals
Baytown (N-504)					
Sample	1.2	91	7	1	100
Census	3	86	8	3	100
Calhoun County (N-200)					
Sample	3	86	10	2	101
Census	10	83	5	2	100
Cameron Parish (N-208)					
Sample	2	91	5	1	99
Census	10	81	6	2	99
Chambers County (N-204)					
Sample	3	88	7	1	99
Census	9	81	7	3	100
Galveston (N-399)					
Sample	5	75	16	5	101
Census	14	69	11	6	100

*In order to make the two sets of figures more comparable, the 14-17 year old categories were subtracted from the total N of the census, and subsequently from the 'single' category, before percentages were figured for the census. Again, the samples included only the heads of households.

Table A.4. Race, in Percentages*

Communities	White	Non-white	Totals
Baytown (N-504)			
Sample	93	7	100
Census	93	7	100
Calhoun County (N-199)			
Sample	95	5	100
Census	95	5	100
Cameron Parish (N-208)			
Sample	93	7	100
Census	94	6	100
Chambers County (N-203)			
Sample	87	13	100
Census	81	19	100
Galveston (N-329)**			
Sample	61	39	100
Census	74	26	100

*For heads of households only.

**There were 72 "no answers" in Galveston, nearly all of which were identified from various measures to be white, which would change the percentages to 68 - 32.

Table A.5. Age, in Percentages*

Communities	20-39	40-59	60 and Above	Totals
Baytown (N-955)				
Sample	42	46	12	100
Census	43	42	14	99
Calhoun County (N-375)				
Sample	50	40	10	100
Census	56	33	11	100
Cameron Parish** (N-381)				
Sample	39	47	12	98
Census	47	37	16	100
Chambers County (N-384)				
Sample	39	48	13	100
Census	44	39	17	100
Galveston (N-708)				
Sample	36	44	20	100
Census	40	39	21	100

*Sample includes heads of household and their spouses only. Also, the sample age categories are 20-40, 41-60 and over.

**4.3 per cent of women in sample had no age reported.

Table A.6. Family Income, in Percentages*

Communities	Under $3,000	$3-4,999	$5-7,999	$8-9,999	$10,000 and Over	Totals
Baytown (N-469)						
Sample	9	15	35	26	16	101
Census	16	16	32	16	20	100
Calhoun County (N-175)						
Sample	20	11	38	21	11	101
Census	26	20	33	10	11	100
Cameron Parish (N-205)						
Sample	12	25	36	14	13	100
Census	30	28	28	7	8	101
Chambers County (N-192)						
Sample	23	15	39	15	9	101
Census	27	20	36	7	11	101
Galveston (N-381)						
Sample	31	28	23	11	7	100
Census	28	26	26	10	11	101

*Income for sample is categorized differently: under 2,500; 2,500-4,500; 4,500-7,500-10,000; and over 10,000.

Table A.7. **Education, in Percentages***

Communities	0-7th	8th	9-11th	High School Graduate	Some Coll.	Coll. Grad.	Totals
Baytown (N-957)							
Sample	10	8	19	30	20	13	100
Census	22	9	22	24	12	10	99
Calhoun County (N-175)							
Sample	23	6	22	30	10	9	100
Census	34	10	20	21	8	8	101
Cameron Parish (N-404)							
Sample	33	14	18	18	7	10	100
Census	51	9	20	13	4	4	101
Chambers County (N-380)							
Sample	23	8	24	23	12	9	99
Census	38	12	18	20	6	5	99
Galveston (N-707)							
Sample	24	13	23	25	8	7	100
Census	36	11	20	20	7	7	101

*Sample includes heads of households and spouses only. Census does not include 20-24 year olds.

Table A.8. Male Occupation for Those Employed, in Percentages*

Communities	Professional Managerial	Farm	Clerical-Sales	Craftsmen-Operatives	Service	Labor	Total
Baytown (N-422)							
Sample	26	1	5	54	5	8	99
Census	25	1	10	50	5	9	100
Calhoun County (N-166)							
Sample	26	13	5	35	8	13	100
Census	19	7	7	45	4	18	100
Cameron Parish (N-126)							
Sample	17	25	1	41	8	8	100
Census	8	8	3	55	5	11	100
Chambers County (N-161)							
Sample	20	12	2	39	7	19	99
Census	15	9	4	45	4	23	100
Galveston (N-263)							
Sample	22	1	7	27	19	24	100
Census	24	0	16	32	12	16	100

*Census is for 14 years of age and above, while sample is for 20 years and above.

Table A. 9. Female Occupations for Those Employed, in Percentages*

Communities	Professional Managers	Farm Owners	Clerical-Sales	Craftsmen-Operatives	Service	Labor	Total
Baytown (N-101)							
Sample	44	0	30	1	25	0	100
Census	24	0	44	5	27	0	100
Calhoun County (N-54)							
Sample	33	4	35	0	28	0	100
Census	32	1	32	4	30	2	101
Cameron Parish (N-35)							
Sample	46	0	34	3	17	0	100
Census	22	0	29	9	40	0	100
Chambers County (N-43)							
Sample	37	0	28	0	33	2	100
Census	30	0	30	4	34	2	100
Galveston (N-99)							
Sample	17	0	24	1	55	3	100
Census	24	0	36	5	34	1	100

*Census is for 14 years of age and above, while sample is for 20 and above.

Table A. 10. Percentage of Employed, Females*

Communities	Percentage
Baytown (N-493)	
Sample	20.5
Census	33.0
Calhoun County (N-189)	
Sample	28.6
Census	26.7
Cameron (N-208)	
Sample	28.8
Census	17.5
Chambers County (N-200)	
Sample	21.5
Census	26.2
Galveston (N-370)	
Sample	26.8
Census	39.2

*Census is for 14 years old and older, while sample is for 20 years and older.

Table A. 11. Number of Children per Household

Communities	No. of Children
Baytown (N-504)	
Sample	1.65
Census	1.13
Calhoun County (N-200)	
Sample	2.14
Census	1.58
Cameron (N-208)	
Sample	1.59
Census	1.31
Chambers County (N-204)	
Sample	1.59
Census	1.26
Galveston (N-401)	
Sample	1.48
Census	.93

Interviewing was done primarily in households, during the day. One obvious result of this procedure was that more women were interviewed than men. However, the proportion of sexes represented was near the proportion obtained by the census for the entire population of comparable age range. The question raised by the fact that more women than men were interviewed is: "Did the women answer the questions differently than their husbands would have?" Considering the time lapse between the storm and the interview, it seems likely that a firm consensus had been reached.

But some questions come to mind as being important in this regard: whether or not, and the degree to which, evacuation was discussed within the family and with others; family member's reaction to evacuation; perception of organizational responsibilities. It is assumed that factual questions would receive, on the whole, as accurate answers from women as from men. On the questions where judgments are made, there might be appreciable differences. However, there is no way to test this precisely.

As noted elsewhere (Chapter III) we did make an attempt to see if there were any significant differences between men and women respondents' answers about family members' attitudes toward evacuation. No significant differences were observed.

Another result of day-interviewing in households was an over-representation of married couples with children. With the exception of Galveston, middle-aged couples with children were over-represented in the samples. This is deduced from the facts that the middle-aged and married categories are high and the number of children per household is also high. It seems logical to assume that women with young children would be more likely to be at home than women without children or with older children, i.e., they would be less likely to be working.

Even though no exact comparisons can be made, conclusions can be drawn from the general nature of the sample. On the whole, it seems reasonably good. The major flaws, besides the two just mentioned, are as follows. In Baytown and Calhoun County, the Spanish-speaking population was probably under-represented. In Chambers County, the Negro population was under-represented. In Galveston, the Negro population was over-represented. These discrepancies would seem to account for most of the differentials on income, education, and occupation. Slight differentials could be expected in all categories because the samples included only heads of households and their spouses, while the census included all in the household.

Interview Guides

The interview schedules were developed over a period of several months while the contract for the research was being negotiated. Initial conferences immediately after the hurricane outlined the general areas of inquiry; and these were more definitely delineated at subsequent conferences. Schedules used in prior projects were extracted from the files of the Disaster Study at the University of Texas and contributed many items, either in verbatim or rewritten form. Tentative instruments were developed, subjected to field test, examined for logical pertinence of items to the areas of inquiry and tentative hypotheses stated and revised.

Finally a series of nine schedules was adopted. These were designed so that persons with differing experiences and statuses would only be interviewed concerning their activities pertinent to the study. The areas with which they were concerned, and the number of items included in each were:

Subject Area	No. of Items
General background	49
Warning and decision to evacuate	41
Experiences of non-evacuees	23
Experiences of evacuees	101
Financial loss and insurance	25
Performance ratings of major institutions	14
Experiences of institutional leaders	77
Host to refugees, in homes	44
Check list of shelter problems	42

An additional set of two schedules was administered in Baytown only for the State Department of Health. These were delivered to that agency and do not constitute a part of the data for the study reported here.

After being developed and tested the schedules were further edited and approved by the Office of Emergency Planning and the Bureau of the Budget. Formal approval was received on May 18, 1962. Thus, after the lapse of something more than eight months interviewing began.

Actually, field work had been underway for some time before the schedules had been formally approved. Preliminary forms of the instruments had been tested under field conditions in each of the sites, and extended interviews with institutional leaders had been made in

each of the sites and in some other places within the devastated area. Further, local supervisors had been secured in Baytown, Calhoun County, Galveston, and Cameron Parish and they had recruited and given preliminary information on the project to prospective interviewers. Late in May, 1962, the interviewers began calling at homes and filling in schedules. This phase of the study was fairly well completed within two weeks, though at each site some quotas were slow to fill and some rechecking was necessary.

As interviews began arriving in the Disaster Study office, each one was edited and its completeness checked. Incomplete interviews were laid aside. Usually the incompleteness arose from the interviewer's reluctance to ask certain questions, e.g., those related to income, occupation, and religion. A personal letter was sent to each interviewer giving him the name of the interviewee, the information needed on that person, and requesting completion of the interview. Almost without exception the needed information was returned so that coding might proceed. Unsatisfactorily completed interviews were not used.

The coding key consisted basically of pre-coded questions. The open-end questions were coded after an examination of the data. It was necessary to collapse some categories and expand others among the pre-coded questions. Basically, however, the original schedule was found to be adequate.

Each question on each schedule was first coded by a research associate. Next, the coded answers for each schedule were punched on I. B. M. cards. Eight cards were punched on each informant. Each card contained an identification number, the site location number, the interview number, 21 control variables (socio-economic characteristics), and coded information directly from the schedule.

After the cards were punched, item counts and percentages were tabulated for each site. This was done on the I. B. M. computer (1620) at Louisiana State University. The cards were then run again to obtain information for tables to test the hypotheses.

When analysis had proceeded to this point, the co-directors and research associates of this project began the tedious process of collating, synthesizing, and interpreting the numerical results obtained.

As the study progressed, information was sought and usually obtained from other sources. The Texas Department of Public Safety, the Adjutant General and the Division of Defense and Disaster Relief of the governor's office gave access to their message files for the

period of the immediate emergency. Officials of these and other agencies were generous in supplying information. A number of articles and one small book (Hogan, 1961) appeared and data were extracted from these when it appeared to be pertinent. Unfortunately, the excellent historical and analytic account by Mattie E. Treadwell did not appear until our study was in process of final editing; else more extensive use would have been made of it. Newspaper material was clipped and made available. Radio Stations KTBC and KASE in Austin made a gift of their teletyped material on the hurricane, and radio station KTRH in Houston supplied a tape containing some of the material they had broadcast. The Houston Chronicle, the Houston Press and Time-Life, Inc., supplied photographs used as illustrations. The reproduction of the barometer graph was obtained from the Office of the Director of Civil Defense for Calhoun County, Port Lavaca, and the photograph of the radar scope from the Naval Air Station, Corpus Christi. Uniformly, our requests for data and assistance were met generously. We have attempted to extract and record the pertinent portions of the data available to us and to draw from them the conclusions and implications that seem to be warranted.

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